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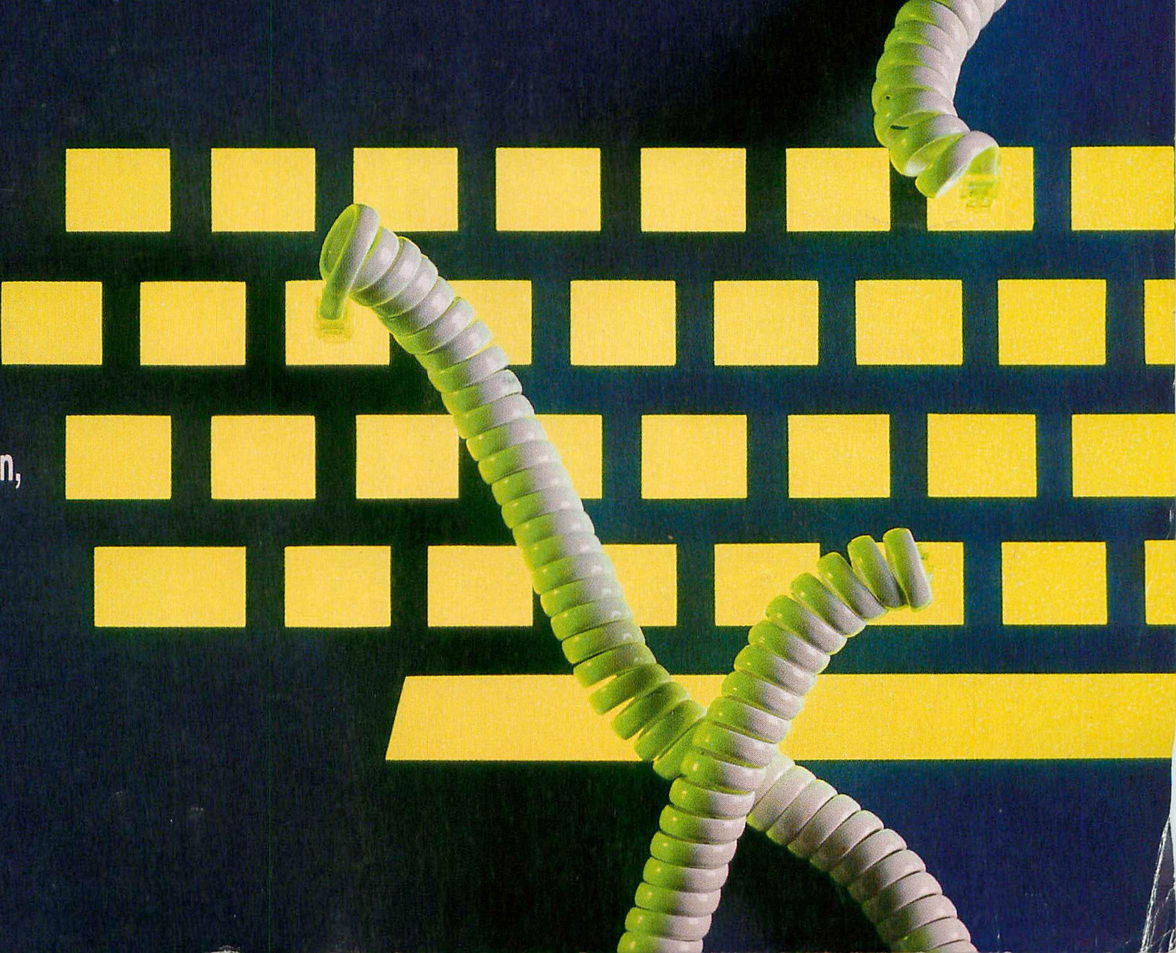

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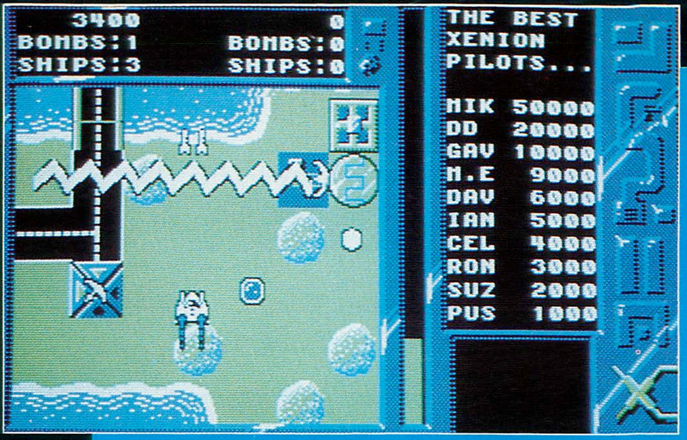

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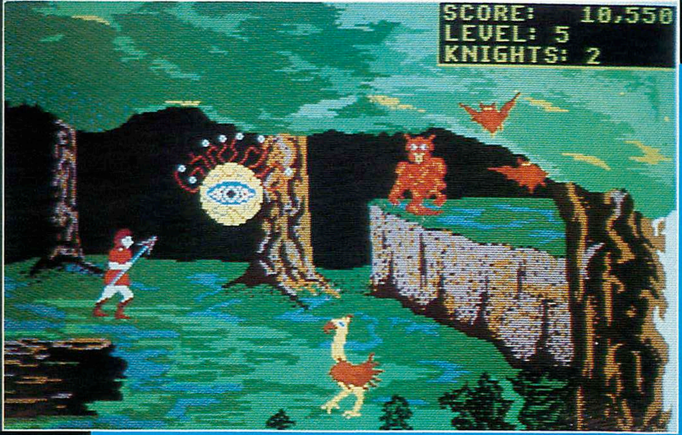

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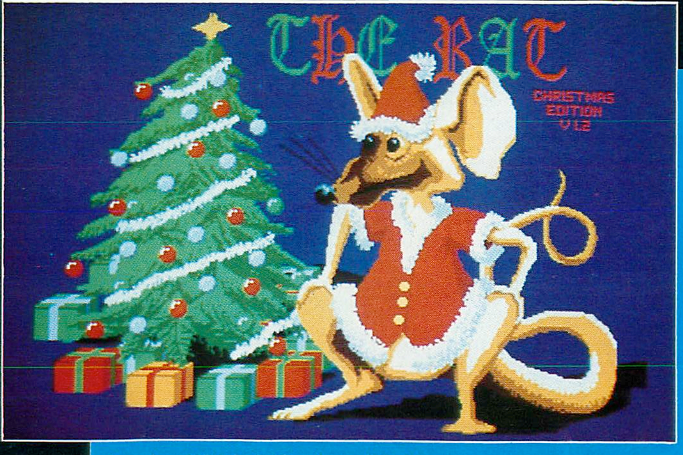

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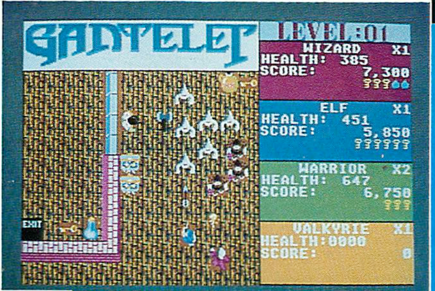

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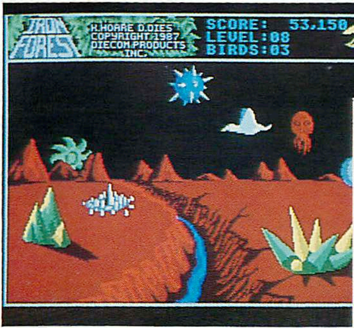

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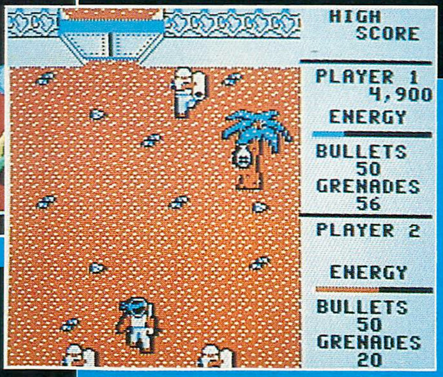

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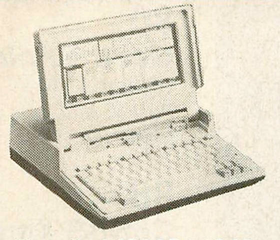
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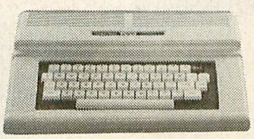
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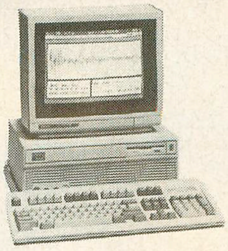
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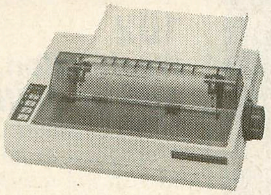
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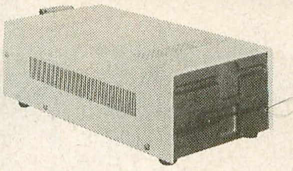
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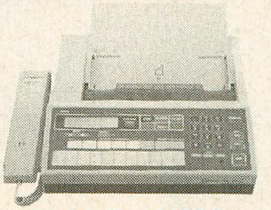
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RAINBOW

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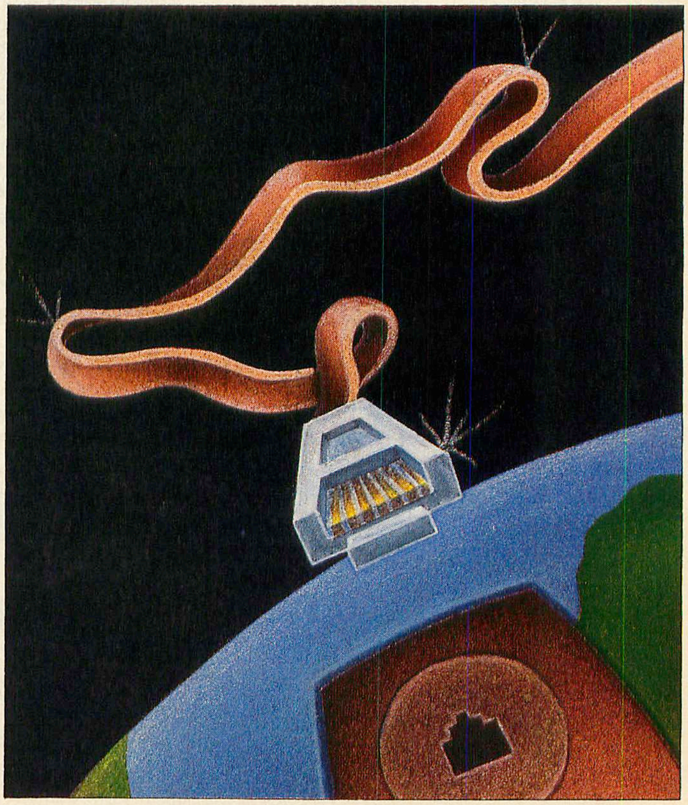

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Letters to the RAINBOW

BACK TALK

Editor:

I was a bit dismayed by Richard Esposito's answer to Elbert Jenkins in the September '88 "Doctor ASCII" column [Page 138]. He infers that Mr. Jenkins problem with writing to the *VIP Library* disk has to do with copy protection. This is not the case at all! Mr. Jenkins finds zero grans available on the disk because the "leftover" room on the disk has been disabled by placing a value in the GAT pointing to this area. Primarily, this is done to prevent writing to the master disk and possibly crashing it. Mr. Jenkins could (on a backup) use his *VIP DiskZap* to find a full granule that is open and place $FF in the GAT at the byte pointing to that granule. Then he could save his program to the disk.

D.S. Ricketts
Boring, OR

REVIEWING REVIEWS

Editor:

I am very fond of *VIP Writer III* and thought that I should add a couple of comments to Ms. Willoughby's nice review of it. The customizer program is apparently much more extensive than indicated in the review. It not only configures *VIP Writer III* with the screen width, line width, screen and printer margins, baud rate, parallel or serial printer driver, etc., it also has three programmable function keys so that they are available as soon as you boot up the program. Ms. Willoughby mentions the use of the CLEAR key as a "control key," just like the old *Writer*. The CTRL key serves the same purpose now, so you have a control key on both sides! Ms. Willoughby didn't like the partial saving of the text if the cursor wasn't at the top of the file — I consider that little feature a *vital* asset because many times I need to save only a portion of the buffer. And, as stated in the review, *VIP Writer III* does tell you that you have done only a partial save — in text and with a loud *bong*. Finally, when overstriking a line of text and going past the end of that line, all you have to do is press BREAK to take out the newly inserted line and simply delete anything necessary.

D.S. Ricketts
Boring, OR

INFORMATION PLEASE

Editor:

I run a 24-track studio and own three CoCos for music production and would like to know if anyone out there has a patch or modification for Radio Shack's *Audio Spectrum Analyzer* for the CoCo 3.

Michael Bridges
Germantown Recording Studio
1209 Ave. N.
Nashville, TN 37208

HINTS & TIPS

Editor:

I recently ruined my Multi-Pak Interface by trying to upgrade it myself, so I wound up buying a new one. In Marty Goodman's "CoCo Consultations," July '88 [Page 146], Marty said that Tandy was not selling CoCo 3-compatible Multi-Paks. I wrote Tandy and was told that the discontinued Multi-Paks were the ones with the satellite board installed. So, if you are thinking about buying a new Multi-Pak for the CoCo 3, first look in the port that plugs into the CoCo. If you see a small satellite board, the Multi-Pak is upgraded. If not, you will need to upgrade.

I have also heard that the new Multi-Paks have a small side effect. When you turn off your CoCo, sometimes the drive motor comes on. This is due to noise being introduced into the Multi-Pak through the CoCo. If this happens, press reset, or turn both the CoCo and the Multi-Pak off and on again.

John Cleaveland
Lunenburg, Nova Scotia

A Memory Aid

Editor:

Since my purchase of ADOS and *Sub-Battle Simulator*, I have had to memorize several commands for each of my command keys. Instead of memorizing the commands for each program, I have made several placards, which frame my keyboard. On these placards — one for each program — I have written the functions of the various keys either next to the key or in the margin. Poster board, manila folder, etc. could be used to make the placards, and you can make as many as you need.

Also, as a member of the printing industry, I was quite impressed with your May and June covers. I think that they are the best covers you've printed to date. I think the coated paper cover for the July issue and the decision to seal the magazine in plastic were great ideas. Sealing the magazine in plastic not only protects the product, but it also looks sophisticated.

Craig Bathurst
Greenville, SC

KUDOS

Editor:

I live in New Zealand and have been operating a Color Computer for about four years. I own a CoCo 3. As a teacher, I find my computer an invaluable aid to preparing work for my pupils. Unfortunately, the CoCo is no longer sold in this country, and all necessary computer purchases must be ordered from various places in the United States. I write to thank you for your impressive publication and to offer some advice to others in my situation.

THE RAINBOW is a must for anyone in an isolated situation. The ads and the reviews really help users to choose the best software for their needs. I have had to purchase a lot of software since I upgraded to my CoCo 3, and every issue of RAINBOW tempts me to purchase more. While I have been more than happy with most of my purchases, there are occasional problems. The *general* rule seems to be that the more you pay for software, the better it is.

Another tip I must pass on to others in my situation concerns mail order suppliers. There is nothing more nerve-wracking than to order an expensive or delicate item by phone and then to wait as the weeks tick by, peering hopefully into the mailbox every day. I have ordered from many suppliers and would like to recommend those who have provided excellent and reliable service.

Computer Plus heads my list. It provides friendly and reliable service of the first order. Microcom Software can also be relied upon, and Micro World is another firm that provided regular first rate service.

Thank you, RAINBOW, for providing a contact with the rest of the CoCo Community.

Phil Burt
North Canterbury, New Zealand

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PEN PALS

• I am a 17-year-old grade 12 student at St. Jerome's High School in Kitchener and would like to have pen pals from anywhere, but preferably close so we can meet sometimes. I have a 64K CoCo 2, one disk drive, a tape recorder and a DMP-130A printer. I like writing special-purpose programs and would like to help anyone with problems.

Anton Peter Milardovic
8 Smetana Dr.
Kitchener, ON, Canada N2B 3B8

• I am a 16-year-old male and would like to hear from anyone in the United States. I prefer someone around my age, but I will answer anyone. I have a 64K CoCo 2, CoCo 3, disk drive, cassette recorder, Multi-Pak, DMP-130, RS Speech & Sound Pak and *Orchestra 90*. I an interested in music, graphics, machine language, Adventures and games.

Orman Beckles
45 Meridian St.
Malden, MA 02148

• I am a 20-year-old man looking for pen pals who have a CoCo 2 or 3. My system includes a CoCo 3, 501 disk drive, cassette recorder and DMP-105 printer. My other interests are sports, baseball-card collecting and photography. I will answer all replies.

Charles Braude
69-10 Yellowstone Blvd.
Forest Hills, NY 11375

• I am 14 years old. I have a CoCo 3 and my hobbies are freestyle skateboarding and swimming. I love to listen to music and watch movies. I would like for a girl my age or older to answer my letter, but if anyone else writes, I'll answer as many as possible.

Timothy W. Smith
Rt. 1 Box 147
Leland, NC 28451

• I am 13 years old and would like some pen pals from all over the world. I own upgraded CoCos 1 and 2, a DMP-105, FD 502 and a Multi-Pak Interface. I love Adventure games and science. I will answer all letters — no age limits.

Juli Williams
Star Rt. 24-2A
Graford, TX 76045

• I am 16 years old and looking for pen pals aged 14 to 21. I am interested in everything about my computer. I have a 64K CoCo 2, one FD 500 drive and a DMP-110. I welcome letters from all over the world.

Bednarek Luc
Hanebergstr. 62
3960 Beverlo
Belgium

• I am 16 years old and interested in a pen pal. All letters will be appreciated.

Christie Goedert
Rt. 3 Box 265
Stockton, MO 65785

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type `RAI` to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type `LET` to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

Computer Uses — You Decide

My all-time favorite computer story is about the friend who came over many years ago, to look at my new Color Computer.

It was hooked up to a television set (that being the monitor) in our spare bedroom — somewhat affectionately known as the "blue room" since the walls were painted blue and there was a blue carpet on the floor — and sat in regal splendor on a roll-top desk I had bought several years before.

"What does it do?" he asked.

Since this was a 4K Color Computer (the largest amount of memory at the time) with BASIC built in, and since I had just taught myself some very basic BASIC, I did some simple things like changing the color of the screen, making the computer count to 100 very quickly and the like.

Even then, I am afraid, I was into toys. My friend had been through several crazes, suffered through explanations of why this or that was the greatest thing since sliced bread, and watched and waited as I grew tired of them. I am sure he viewed the computer as "Lonnie's latest toy" and viewed my enthusiasm with skepticism.

After a half-hour demonstration, he asked me one simple question: "But how do you ask it questions and get answers?"

"You don't," I replied. "It only gives you back what you have put into it."

"Well, what good is it?" he asked. "I want answers to questions."

Today my friend has two computers in his house. One is a Color Computer; the other is a Tandy 1000.

I am relating this story because this is our November issue and you can do a friend of yours a favor by telling him or her about your computer.

(continued on Page 14)

Word Power 3.2

More Versatile • More Powerful With
Spooler • Calculator • Split-Screen • 2-Column Printing

Unparalleled Power packed in this 100% ML Word Processor written from scratch for the CoCo 3! **No other word processor offers such a wide array of features that are easy to learn & use.**

DISPLAY & SPEED

Word Power 3.2 runs at double-clock speed and uses the **true 80-column display** with lowercase instead of the graphics screen. The result is lightning fast screen reformatting and added speed! **All prompts are displayed in plain English in neat colored windows.** The current column number, line number, page number, percentage of free memory is displayed at all times. Even the **page break** is displayed so you know where one page ends and the other begins. The Setup program allows you to change fore/background colors as well as (in)visible carriage returns. Word Power 3.2 can be used with RGB/Composite/Monochrome monitors as well as TV.

MAXIMUM MEMORY

Word Power 3.2 gives you **over 72K** on 128K and **over 450K** on 512K CoCo 3 for Text Storage - more memory than any other CoCo word-processor. Period.

EFFORTLESS EDITING

Word Power 3.2 has one of the **most powerful and user-friendly full-screen editor with word-wrap.** All you do is type. Word Power takes care of the text arrangement. The unique **Auto-Save** feature saves text to disk at regular intervals for peace of mind.

Insert/Overstrike Mode (Cursor Style Changes to indicate mode);OOPS Recall during delete;Type-ahead Buffer for fast typers;Key-Repeat (adjustable); Key-Click; 4-way cursor and scrolling; Cursor to beginning/end of text, beginning/end of line, top/bottom of screen, next/previous word; Page up/down; Delete character, previous/next word, to beginning/end of line, complete line, text before/after cursor; Locate/Replace with Wild-Card Search with auto/manual replace; Block Mark, Unmark, Copy, Move & Delete; Line Positioning (Center/Right Justified); Set/Reset 120 programmable tab stops; Word-Count; Define Top/Bottom/Left/Right margins & page length. You can also highlight text (underline-with on-screen underlining, bold, italics, superscripts, etc.). Word Power even has a **HELP** screen which an be accessed any time during edit.

SPLIT-SCREEN EDITING

Splits the screen in half so you can view one portion of your text while you edit another. You'll love it!

MAIL-MERGE

Ever try mailing out the same letter to 50 different people? Could be quite a chore. Not with Word Power 3.2! Using this feature, you can type a letter, follow it with a list of addresses and have Word Power print out personalized letters. It's that easy!

CALCULATOR

Pop-up a 4-function calculator while you edit! Great for tables!

SAVING/LOADING TEXT

Word Power 3.2 creates ASCII format files which are compatible with almost all terminal/spell-checking & other word-processing programs. Allows you to Display Free Space, Load, Save, Append & Kill files. The ARE YOU SURE? prompt prevents accidental overwriting & deletion. You can select files by simply cursoring through the disk directory. Supports double-sided drives & step-rates.

PRINTING

Word Power 3.2 drives almost any printer (DMP, EPSON, GEMINI, OKIDATA, etc). Allows options such as baud rates, line spacing, page/print pause, partial print, page numbering/placement, linefeeds, multi-line headers/footers, right justification & number of copies. The values of these parameters & margins can be changed anytime in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear in print. You can view margins, page breaks, justification & more.

PRINT SPOOLER

Why buy a hardware Print Spooler? Word Power 3.2 has a **built-in Spooler** which allows you to simultaneously edit one document & print another.

TWO-COLUMN PRINTING

This unique feature allows you to print all or portion of your text in **two columns!** Create professional documents without hours of aligning text.

SPELLING CHECKER

Word Power 3.2 comes with spelling checker/dictionary which finds & corrects mistakes in your text. You can add words to /delete words from dictionary.

PUNCTUATION CHECKER

This checker will proofread your text for punctuation errors such as capitalization, double-words, spaces after periods/commas, and more. Its the perfect addition to any word processor.

DOCUMENTATION

Word Power 3.2 comes with a well-written instruction manual & reference card which makes writing with Word Power a **piece of cake!** Word Power 3.2 comes on an UNPROTECTED disk and is compatible with RSDOS. Only **$79.95**

(Word Power 3.1 owners can get Word Power 3.2 Upgrade FREE by sending proof of purchase & $5.00 to cover S&H costs & instructions)

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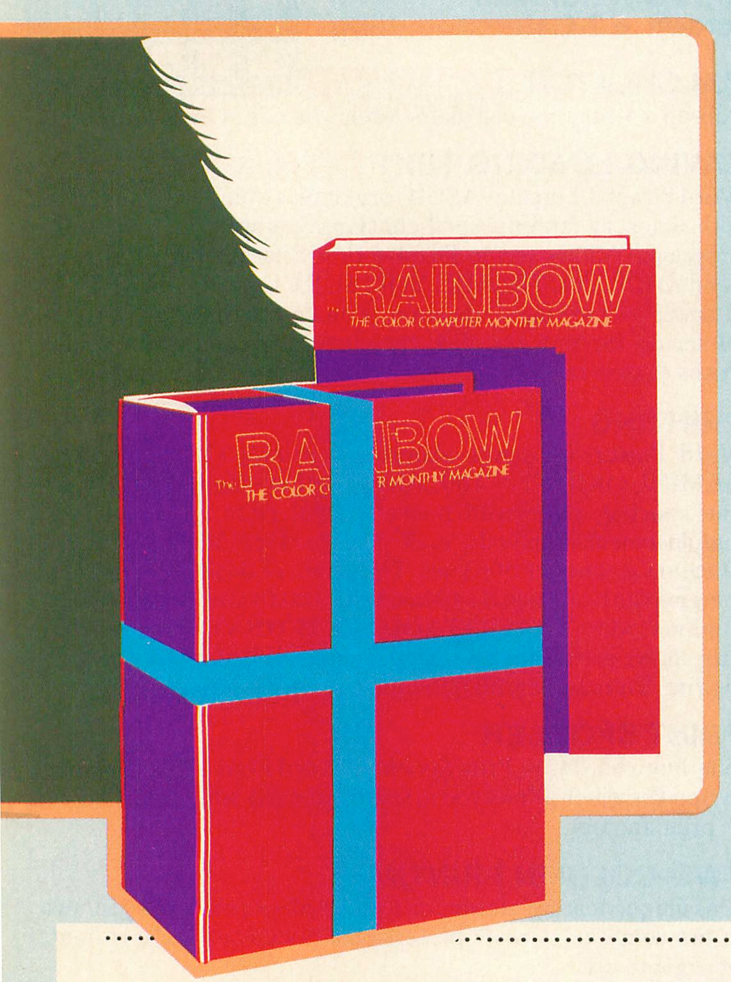
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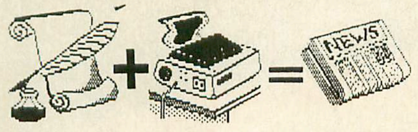

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By Prakash Mishra

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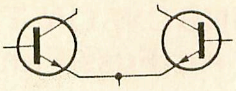

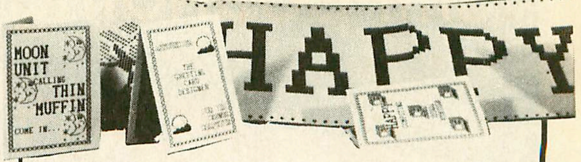

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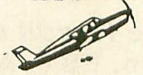

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Obviously, I did not "get tired" of my computer. The reason is a very simple one — and it really relates to the complaint my friend had when he first saw my first computer. Our computers, all of them, are really nothing more than empty boxes waiting to be filled with whatever we are interested in.

> ***"Our computers are really nothing more than empty boxes waiting to be filled with whatever we are interested in."***

That is the secret, of course.

No matter what your interest, you can "fill up" your Tandy computer with information about it. Art and words, data (read that information of any kind) and communications — whatever it is, you have the empty box right there, and you can fill it to the brim with your own interests.

I have heard literally hundreds of stories over the years from people who bought a computer for one single reason or another — to balance a checkbook, to play games, to write letters — and found that simply and easily, just by adding another program, they could make it do all of those things and so much more.

I think my favorite recreational use of the computer is using my desktop publishing program to create little "newspapers" celebrating one event or another in the lives of my family and friends.

When the friend I mentioned at the start of this column turned 45, I did a special "newspaper" for him — all about him. When my daughter was married a few months back, there was another. Other events have been "celebrated" in the same way.

For me, these are creative and fun. But the nicest thing of all is that doing just them would never justify the expense of a computer. So, at home, *I also* play some games, keep track of expenses, have files of all my books and do a myriad of other things. Yes, interest in this or that will flag, but, remember, the computer is just an empty box waiting for me to fill it up.

I know most of you know this. But I am sure you have friends who do not. Do them each a favor. Tell them to buy computers as presents to themselves next month.

And, yes, tell them to get that Color Computer from Tandy. Because, as time has proven, there really is no better value.

— Lonnie Falk

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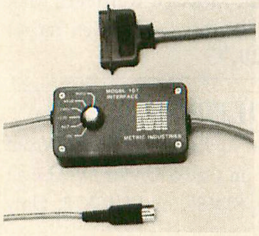

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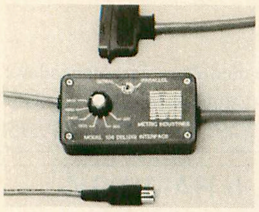

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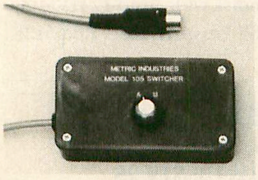

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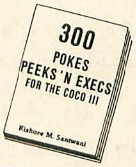

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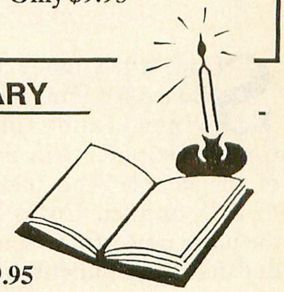

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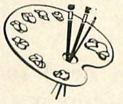

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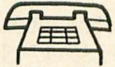

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Modifying the CoBBS system to work with the CoCo 3

A CoBBS Update

By Kevin Sloan

Since 1985 many Color Bulletin Board Systems have been in use. When Tandy introduced the Color Computer 3 in mid-1986, many of the people who had been running *CoBBS* on their CoCo 2s upgraded to the more powerful CoCo 3, only to find out that their bulletin boards wouldn't work.

The incompatibility lies in the new interrupt structure. Since memory in the CoCo 3 can be "moved" with the memory management unit, an additional interrupt service was added to keep the machine from performing an interrupt to an area of memory that had been moved. For instance, when you do an `HSCREEN2`, memory at $60000 to $67FFF is moved into the CPU (central processing unit) address space of $2000 to $9FFF. If the `IRQ` (the interrupt that keeps the time on the timer function and in the software clock of *Coterm*) is serviced while the Hi-Res screen memory is in this location, BASIC crashes. Therefore, the initial interrupts were changed to point to $FEEE instead of $100.

The software clock in *Coterm* is the specific culprit. It pulls the `IRQ` address from $FFF8 and $FFF9 and tries to put its "detour" into $FEF8 and $FEF9 (where $FFF8 and $FFF9 point). The result is a foregone conclusion — the computer will crash and lock up.

The fix is very simple, and all changes that follow are to the original *CoBBS* system series appearing in THE RAINBOW from November 1985 to February 1986. To fix the software clock, just put these three pokes in `STARTUP` right after *Coterm* is loaded from disk:

```
71 POKE &HF78, &H8E
72 POKE &HF79, &H01
73 POKE &HF7A, &H0C
```

The software clock in *Coterm* can now be used with the CoCo 3 as it would be normally with the CoCo 1 or 2.

But that's not all you must do to get *CoBBS* working. You need to remove the useless Error Trapper, since the CoCo 3 has that built in. To ensure that it is not poked into memory, delete the `GOTO 250` in Line 210 in `STARTUP`:

```
210 FOR A=&H10D5 TO &H10D7:POKE
A,&H12:NEXT A
```

Next, all of the `RUNT`s need to be changed to `ON ERR GOTO`. Here is a list of the line numbers in `USER/SYS` and `COBBS/SYS` where they can be located:

`USER/SYS` lines:
10, 20, 61, 64, 66, 68, 70, 80, 110, 180, 210, 305, 365, 371, 410, 415, 420, 430, 510, 905, 980, 7025, 7030, 8005, 9005 and 9610.

`COBBS/SYS` lines:
9, 11, 70, 405, 555, 604, 655, 1005, 1190, 1205, 1215, 1226, 1228, 1235, 1245, 1255 (two changes), 1275, 1290, 1310, 1340, 1342, 1345, 1375, 7025, 7030, 7040, 7041, 7060, 9615 and 9810

An easier way to do this is to save `USER/SYS` and `COBBS/SYS` as ASCII files. Then load them up in a word processor and do a universal change of `RUNT` and `RUN T` to `ON ERR GOTO` (*Disk Color Scripsit* doesn't work very well because of its buffer size).

The error-trap processing needs to be upgraded to work with the CoCo 3's new commands as well. Make the following changes: In `USER/SYS`, delete lines 915, 920, 925, 930 and 935. Then retype Line 935 to read:

```
935 ER$="**Error: Type"+STR$
(ERNO)+" in Line"+STR$(ERLIN)
+":User"
```

In `COBBS/SYS` delete lines 1180, 1181, 1182, 1183 and 1185. Retype Line 1185 to read:

```
1185 ER$=CHR$(13)+"*ERROR"+
STR$(ERNO)+" IN LN"+STR$
(ERLIN)+"*":GOSUB870:
PRINTER$:GOSUB9615:TR$=
STRING$(32,"+")+CHR$(13)
+ER$+CHR$(13): GOSUB9600
```

To take advantage of your CoCo 3's Hi-Res text screens. Make the following changes to `USER/SYS`:

Add Line 6: `6 WIDTH32: PALETTE 13,0: Palette 12,63`

Change the `CLS0` to `CLS` in Line 34:

```
34 II=TIMER:IFII>19999AND
PEEK(4694)<>0THEN CLS:IFII
>60000THEN TIMER=20000
```

Insert `WIDTH40:PALETTE8,63:CLS3` in Line 40:

```
40 WIDTH40:PALETTE8,63:CLS3:
EXEC&H10DA:POKE4657,0
```

Insert `WIDTH40:PALETTE8,63:CLS3` in Line 66:

```
66WIDTH40:PALETTE8,63:CLS3:
GOSUB9000:IFK1=0THEN67ELSEGET
#1,1:RE=CVN(H1$):GET#1,2:RS
=CVN(H1$):CLOSE
```

Now your *CoBBS* system should work on your CoCo 3. I will be happy to help you with this upgrade. My bulletin board runs from 10 p.m. CST to 1 p.m. CST of the next day Monday through Friday, or I'll put the system up at any other time upon request. Just call at 300 bps, 7 bits, one stop bit, 601-693-8092.

Editor's Note: The modified `COBBS/SYS` and `USER/SYS` files are included on this month's RAINBOW ON TAPE and DISK.

(Questions or comments concerning this upgrade may also be addressed to the author at 3228 11th Place, Meridian, MS 39305. Please enclose an SASE when requesting a reply.)

Kevin Sloan, a computer operator and programmer by profession, has been using the CoCo for five years and is a very active member of his local user group.

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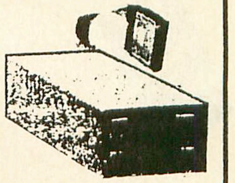

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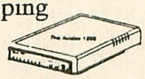

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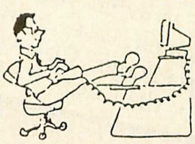

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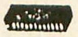

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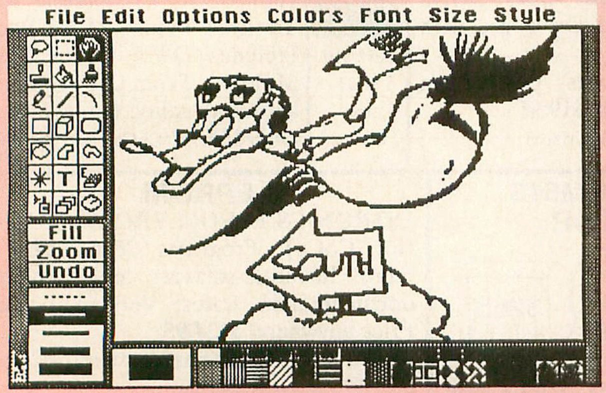

CoCo Max III is absolutely the best drawing package available for the CoCo 3, and it does more than just let you draw. **CoCo Max III** includes animation, text, color mixing and more features than you would think possible. It combines incredible speed with dazzling graphics and it is a joy to use even its most powerful features.

Pictures, graphs, flyers, cards, signs, school projects, labels, buttons and anything else you might dream of creating is now possible with **CoCo Max III**. Is it any wonder that the majority of CoCo Gallery pictures in the last five months were created with **CoCo Max?**

Thousands of CoCo users have found that you don't have to be an artist to have fun with **CoCo Max**. You'll wonder why you waited so long to get the incredible **CoCo Max III**.

CoCo Max III is the best because it includes:
- a huge picture area (*two* full hi-res 320x192 screens) - a large editing window - Zoom mode for detail work - 28 drawing tools which you just point and click on - shrink and stretch - rotation at any angle (1.5 degree steps) - 512K memory support (*all* features work with 128K too) - an Undo feature to correct mistakes - you can even Undo an "Undo" - Animation - special effects - color sequencing (8 colors, variable speed) - thirteen fonts (more available) - each font has eight different sizes - five style options (bold, italic, 3D, etc.) for thousands of font/size/style combination possibilities. - the CoCo Show "slide show" program - color editing of patterns - automatic pattern alignment - prints in single and double size - smart lasso (move text over a background...) - advanced tools: arc, ray, cube, etc. - select 16 of the 64 colors (all 64 colors are displayed at once for selection!) - picture converter (CoCo Max II, MGE, BASIC) - extensive prompting - "glyphic" clipbook of rubber stamps - double click shortcuts - color mixing (additive/subtractive/none) - money back guarantee - sophisticated data compression saves disk space - pull down menus (no commands to remember) - forty paintbrush shapes - two color lettering - spray can - scrapbooks of pictures - error free - Y-cable or multipack not required - high speed hi-res interface included (plugs into joystick port) - disk is not copy protected - amazing "flowbrush" - RGB and composite monitor support - replace color - printing on black and white printers in five shades of gray - full color printing with optional drivers for the NX-1000 Rainbow and CGP220 - entirely rewritten for the CoCo 3

> There are no limits to what you can do with this fabulous program. Speed, ease, animation, power and color, all in one package. **CoCo Max III** is the ultimate program for the CoCo 3. –Rainbow review 4/88

CoCo Max III: $79.95

Max-10 owners: deduct $10

System Requirements:
CoCo 3 disk system and a Joystick or Mouse

Printer drivers included:
IBM/Epson and compatibles, GEMINI, DMP105/106/130,OKI182/192, CGP220 (B&W), DMP110, DMP200

Color printer drivers (prints 125 different colors) Star NX-1000, CGP-220, or Okimate 20 each **$19.95**

For all CoCo Max Versions

Max Edit Font Editor: A font is a set of characters of a particular style. With Max Edit you can create new fonts or modify the existing ones. **$19.95**

Max Font disks (send for list) each **$19.95**

Max Font Set (95 fonts on 4 disks) **$49.95**

DS69/69B Digitizers: allows you to capture the image from a VCR or video camera and bring it into your computer. CoCo Max will let you load digitized pictures and modify them.

DS-69 (2 images per second. Requires multipak) **$99.95**

DS-69B (8 images/second) **$149.95**

CoCo 1 & 2 Owners Still Available:

(See previous ads or write for information)

CoCo Max II (works on all disk CoCos) **$69.95**

CoCo Max Tape (CoCo 1 & 2 only) **$59.95**

Y-Cable **$24.95**

CoCo Max II Picture Disk Set set of 3 disks: **$29.95**

Guaranteed Satisfaction
Use CoCo Max or Max-10 for a full month.
If you are not delighted with either of them,
we will refund every penny.

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Add $3 per order for shipping ($5 to Canada, 10% to overseas)
CT residents add 7.5% sales tax

PUBLISHING

COLORWARE

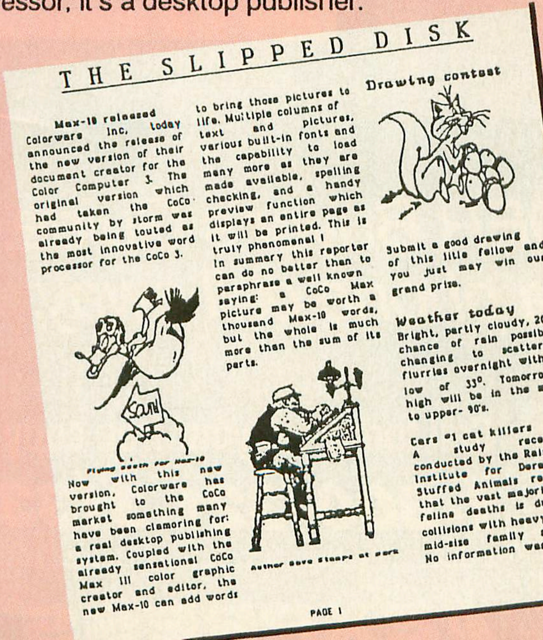
Max-10™

THE DAZZLING WORD PROCESSOR

You probably already have a word processor, and you probably wish it had these features:

- Fully menu driven (CoCo Max style) with point and click marking of text. You don't need the arrow keys!
- True WYSIWYG (What You See Is What You Get) including variable size fonts, styles (bold, italics, etc.) and graphics.
- Can print multiple columns on a page.
- Not limited by printer capabilities: fonts up to 24 points (1/3") high, superscripts, small print, etc.
- Fully integrated spelling checker (incredibly fast), no need to exit program to check spelling.
- Graphics can be imported from just about anything (CoCo Max; MGE; BASIC; even Macintosh pictures from a BBS) and resized to fit your document.
- Full screen preview including graphics.

Max-10 has all these unique features, plus all the features you are used to in your current word processor. Even with all this, you don't give up anything. **Max-10** is easier to use, more intuitive, faster and more powerful than anything else. It's not just a word processor, it's a desktop publisher.



THE SLIPPED DISK

Max-10 released
Colorware Inc, today announced the release of the new version of their document creator for the Color Computer 3. The original version which had taken the CoCo community by storm was already being touted as the most innovative word processor for the CoCo 3.

Flying death for Max-10

Now with this new version, Colorware has brought to the CoCo market something many have been clamoring for: a real desktop publishing system. Coupled with the already sensational CoCo Max III color graphic creator and editor, the new Max-10 can add words to bring those pictures to life. Multiple columns of text and pictures, various built-in fonts and the capability to load many more as they are made available, spelling checking, and a handy preview function which displays an entire page as it will be printed. This is truly phenomenal !
In summary this reporter can do no better than to paraphrase a well known saying: a CoCo Max picture may be worth a thousand Max-10 words, but the whole is much more than the sum of its parts.

Author Dave Stamps at work

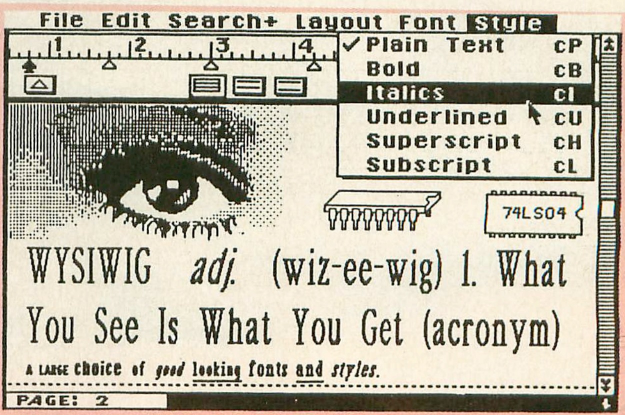
Drawing contest
Submit a good drawing of this litle fellow and you just may win our grand prize.

Weather today
Bright, partly cloudy, 20% chance of rain possibly changing to scattered flurries overnight with a low of 33°. Tomorrow's high will be in the mid- to upper- 90's.

Cars #1 cat killers
A study recently conducted by the Rainbow Institute for Deranged Stuffed Animals reveals that the vast majority of feline deaths is due to collisions with heavy mid-size family sedans. No information was made

PAGE 1

Max–10: $79.95
CoCo Max III owners: deduct $10
Max–10 requires a CoCo 3, at least 1 disk, & joystick or mouse
Printer drivers included: IBM/Epson and compatibles; DMP 105, DMP106, DMP130; CGP220 (B&W); Gemini/Star



WYSIWIG *adj.* (wiz-ee-wig) 1. What You See Is What You Get (acronym)

A LARGE choice of *good* looking fonts and *styles.*

Some of the many features of **Max–10:**
– Blinding speed – printing in multiple columns – online dictionary – spell checking – graphics can be mixed with text – full justification of proportionally sized characters – bold, italic, underline superscript and subscript type styles – superb file support, just point and click – "Undo" lets you correct mistakes – easy to use, no commands to remember – any graphics program can be used – pictures can be shrunk or stretched to fit – right and left alignment – centering – variable line spacing – page numbering – current page number displayed on the screen – variable tab stops – left and right margins – tabs and margins can vary in the same document – cut and paste text and graphics anywhere in the file – page break shows on the screen – pull down menus are quick and simple to use – lightning fast access to any point in the document with the scroll box – twenty fonts (styles and sizes), more available – any number of character sizes and styles can be mixed on the same line – up to more than 120 characters per line, depending on font size, style and letters – headers and footers, even with graphics – file compatibility with other word processors – right, left, bottom and top margins – word wrap – set starting page – type ahead – key repeat – key click – scroll up and down – ASCII file output for compatibility – disk directory – kill files– block cut, copy and move – global search and replace – paragraph indent – clipboard – merge – show file (on disk) – free memory display – page count – paragraph count – word count – graphics can be resized and moved – multiple fonts – error recovery – true lowercase – 512K memory support (all features work with 128K too) – complete point and click cursor control – moving, clearing and changing blocks of text is ridiculously easy, just point and click at each end of the text block – onscreen ruler – preview file before loading – search and replace – disk is not copy protected – more than 35 pages of text

CoCo Max III and Max–10 Perfect Together

You do not *need* **CoCo Max III** to insert and print graphics in **Max–10**. Max–10 works with any graphics creation program, and you can also use graphics downloaded from bulletin boards.

Similarly, you do not *need* **Max–10** to create graphics with text in **CoCo Max III**. There are tremendous lettering capabilities in **CoCo Max III**, with its many fonts, styles, and sizes.

Together **Max–10** and **CoCo Max III** are an unbeatable combination. This desktop publishing system is better than anything you've ever seen on a CoCo. We are so confident that you will use, and enjoy using the two software packages, that we offer an unconditional money back guarantee. Stop wasting your time and effort using inferior or obsolete products. Move up to the new generation of CoCo software now.

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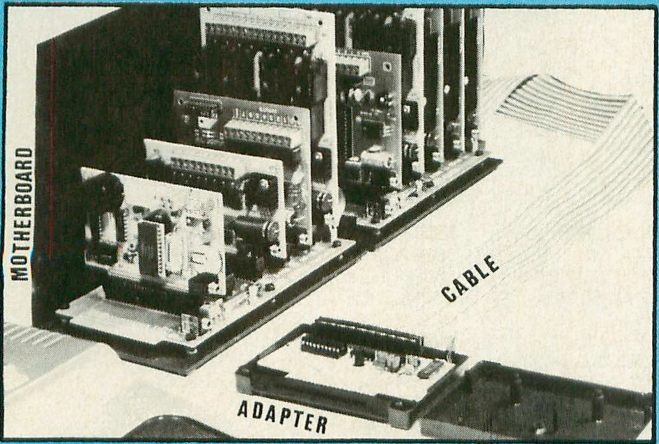
The Amazing A-BUS

NEW



An A-BUS system with two Motherboards
A-BUS adapter in foreground

The A-BUS system works with the original CoCo, the CoCo 2 and the CoCo 3.

Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS adapter plugged into your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for $10.

About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

Relay Card RE-140: $129

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

Reed Relay Card RE-156: $99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card AD-142: $129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter AN-146: $139

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

Digital Input Card IN-141: $59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O DG-148: $65

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

Clock with Alarm CL-144: $89

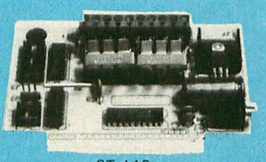
Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

Touch Tone® Decoder PH-145: $79

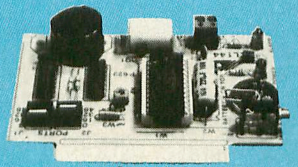
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

A-BUS Prototyping Card PR-152: $15

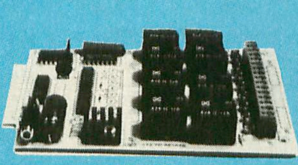
3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s



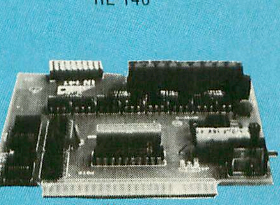
ST-143



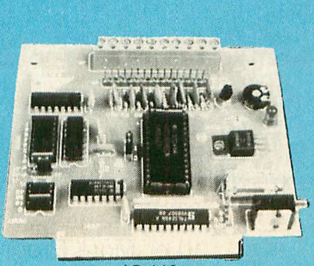
CL-144



RE-140



IN-141



AD-142

Smart Stepper Controller SC-149: $299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option RC-121: $49
To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option PD-123: $89
Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option BB-122: $19
For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver ST-143: $79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).
Special Package: 2 motors (MO-103) + ST-143: **PA-181: $99**

Stepper Motors MO-103: $15 or 4 for $39

Pancake type, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

A-BUS Adapters for:

IBM PC, XT, AT and compatibles. Uses one short slot.	AR-133...$69
Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot	AR-133...$69
Apple II, II+, IIe. Uses any slot.	AR-134...$49
TRS-80 Model 102, 200 Plugs into 40 pin "system bus".	AR-136...$69
Model 100. Uses 40 pin socket. (Socket is duplicated on adapter).	AR-135...$69
TRS-80 Mod 3,4,4D. Fits 50 pin bus. (With hard disk, use Y-cable).	AR-132...$49
TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed).	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I.	AR-131...$39
Color Computers (Tandy). Fits ROM slot. Multipak, or Y-cable.	AR-138...$49

A-BUS Cable (3 ft, 50 cond.) CA-163: $24

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.
Special cable for two A-BUS cards: CA-162: $34

A-BUS Motherboard MB-120: $99

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: $12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

- The A-BUS is not a replacement for the Multi-pak

Add $3.00 per order for shipping.
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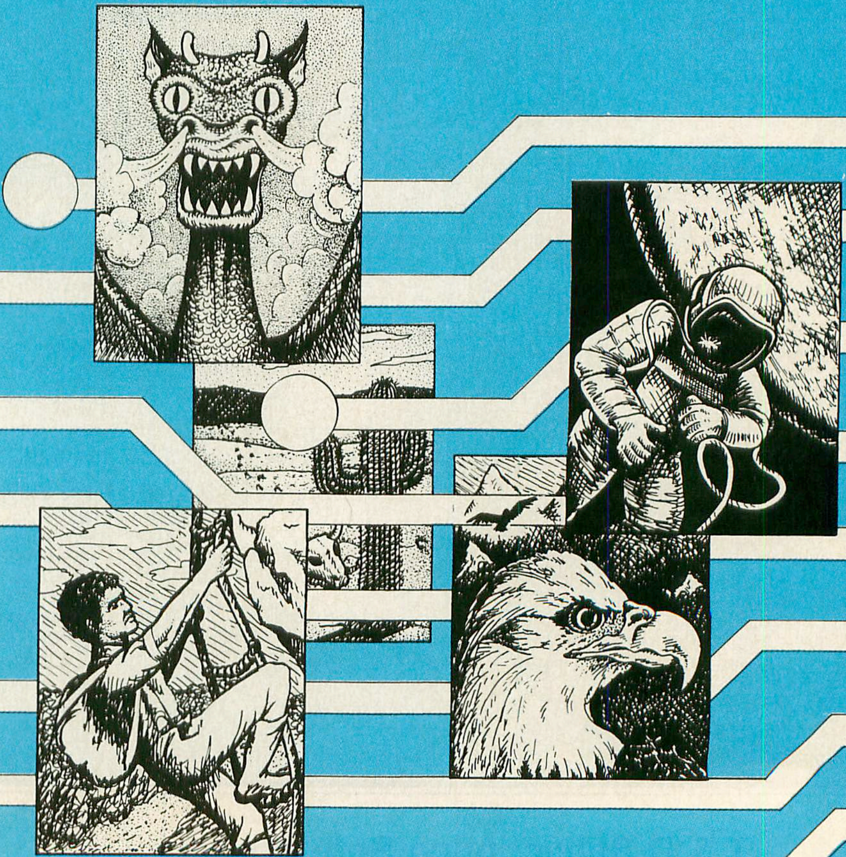

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VIP Writer III 2.0

495K Total Text Space • EASY 4 Color MENUS

"In the beginning there was VIP Writer and users saw that it was good, But it's not the best anymore. There's a new word processor to claim the crown...VIP Writer III –Setting the Standard" —RAINBOW Sept. 1988

COMPARISON CHART

	VIP Writer III	Telewriter 128	Word Power 3
Screen Display	32/40/64/80	40/80	80
Spelling Checker	**VIP Speller**	NONE	FREE WARE
Dictionary Size	50,000 Words	NONE	20,000 Words
Print Spooler	YES	NONE	YES
Total Space 128K	**106,000**	48,000	72,000
Total Space 512K	**495,104**	48,000	450,000

SCREEN DISPLAY OPTIONS

VIP Writer III offers more screen width options -all with 24 lines and actual lower case letters using the CoCo 3's hardware display. It runs at double clock speed and has 4-color menus making VIP Writer III FAST and EASY to use! You can choose foreground, background, hilite and cursor colors from up to 64 hues. Color can be turned ON or OFF for the best possible display using a monochrome monitor or TV set. VIP Writer III has a context sensitive help facility to display command usage in easy to read colored windows.

CUSTOMIZER & PRINTER INSTALLER

VIP Writer III comes with a configuration / printer installation program which lets you customize VIP Writer III to suit your own liking. You can set screen width and colors as well as margins and more. You can also install your own printer and set interface type (serial, parallel or J&M), baud rate, line feeds, etc. Once done, you never have to enter these parameters again! VIP Writer III will load n' go with your custom configuration every time!

TEXT FILE STORAGE

VIP Writer III creates ASCII text files which are compatible with all other VIP Programs as well as other programs which use ASCII files. You can use VIP Writer III to even type BASIC programs! There is a 48K text buffer (438K in a 512K CoCo 3) and disk file linking allowing virtually unlimited text space. VIP Writer III works with up to four disk drives and lets you display directories and free space as well as rename or kill disk files. In addition VIP Writer III is 100% compatible with the RGB Computer Systems Hard Disk.

EDITING FEATURES

VIP Writer III has a full featured screen editor which can be used to edit text with lines up to 240 characters long with or without automatic word wrap around. You can select type-over mode or insert mode. There is even an OOPS command to recall a cleared text buffer. Other editing features include: Type-ahead • typamatic key repeat and key beep for flawless text entry • end of line bell • full four way cursor control with scrolling • top of textfile • bottom of textfile • page up • page down • top of screen • bottom of screen • beginning of line • end of line • left one word • right one word • DELETE character, to beginning or end of line, word to the left or right, or entire line • INSERT character or line • LOCATE and/or CHANGE or DELETE single or multiple occurrence using wildcards • BLOCK copy, move or delete with up to TEN simultaneous block manipulations • TAB key and programmable tab stops • word count • line restore • three PROGRAMMABLE FUNCTIONS to perform tasks such as auto column creation and multiple copy printing.

TEXT FORMATTING

VIP Writer III automatically formats your text for you or allows you to format your text in any way you wish. You can change the top, bottom, left or right margin and page length. You can set your text flush left, center or flush right. You can turn right hand justification on or off. You can have headers, footers, page numbers and TWO auxiliary lines which can appear on odd, even or all pages. You can also select the line on which they appear! You can even change the line spacing! Parameters can be altered ANYWHERE !

PREVIEW PRINT WINDOW

VIP Writer III features an exclusive format window which allows you to preview your document BEFORE PRINTING IT! You are able to move up, down, left and right to see centered and justified text, margins, page breaks, broken paragraphs, orphan lines etc.

PRINTING

VIP Writer III prints TWICE as fast as any other CoCo word processor! It supports most serial or parallel printers using J&M JFD-CP or Rainbow interface and gives you the ability to select baud rates from 110 to 19,200. You can imbed printer control codes anywhere in your text file EVEN WITHIN JUSTIFIED TEXT! VIP Writer III also has TWENTY programmable printer macros which allow you to easily control all of your printers capabilities such as bold, underline, italics and superscript using simple key strokes. Other features include: multiple copy printing • single sheet pause • line feeds.

PRINT SPOOLING

Save up to $150 on a print spooler because VIP Writer III has a built in print spooler with a 57,000 character buffer which allows you to print one document WHILE you are editing another. You don't have to wait until your printer is done before starting another job!

SPELLING CHECKER

VIP Writer III includes VIP Speller AT NO ADDITIONAL COST! VIP Speller checks text for misspelled words and has a 50,000 word dictionary that can be added to or edited.

DOCUMENTATION

VIP Writer III comes with a well written 125 page manual which is Laser printed, not dot-matrix like the competition. It includes a tutorial, glossary of terms and examples for the beginner as well as a complete index!

VIP Writer III includes VIP Speller. **DISK $79.95**

Writer III or Library /W owners: Upgrade to the VIP Writer III 2.0 for $10 + $3 S/H. Send ORIGINAL disk and $13 total.

VIP Writer owners: Upgrade to the VIP Writer III 2.0 for $49.95 + $3 S/H. Send ORIGINAL disk and $52.95 total.

VIP Database III

VIP Database III features selectable screen displays of 40, 64 or 80 characters by 24 lines with choice of 64 foreground, background, hilite and cursor colors for EASY DATA ENTRY. It uses the CoCo 3's hardware screen and double clock speed to be the FASTEST database available! VIP Database III will handle as many records as will fit on your disks and is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. IN-MEMORY SORT of records is LIGHTNING FAST and provides for easy listing of names, figures, addresses, etc., in ascending or descending alphabetical or numeric order. Records can be searched for specific entries using multiple search criteria. The built-in mail-merge lets you sort and print mailing lists, print form letters, address envelopes - the list is endless. The built-in MATH PACKAGE even performs arithmetic operations and updates other fields. VIP Database III also has a print spooler and report generator with unlimited print format capabilities including embeddable control codes for use with ALL printers. **DISK $69.95**

VIP Database owners: Upgrade to the VIP Database III for $39.95 + $3 S/H. Send ORIGINAL disk and $42.95 total.

VIP Library

/Writer Database Enhanced

The VIP Library /WDE combines all six popular VIP application programs - VIP Database III, VIP Writer III, VIP Speller, VIP Calc, VIP Terminal and VIP Disk-ZAP - into one program on one disk! The program is called VIP Desktop. From the desktop you have instant access to word processing with a spelling checker always in attendance, data management with mail merge, spreadsheet financial analysis, telecommunications and disk maintenance. * **DISK $169.95**

For VIP Library shipping please add $4 USA. $5 Canada. $10 Foreign.

VIP Library owners: Upgrade to the VIP Library /WDE for $89.90* + $3 S/H. Send ORIGINAL disk and $92.90 total.

* Future VIP Library upgrades available at reduced cost.

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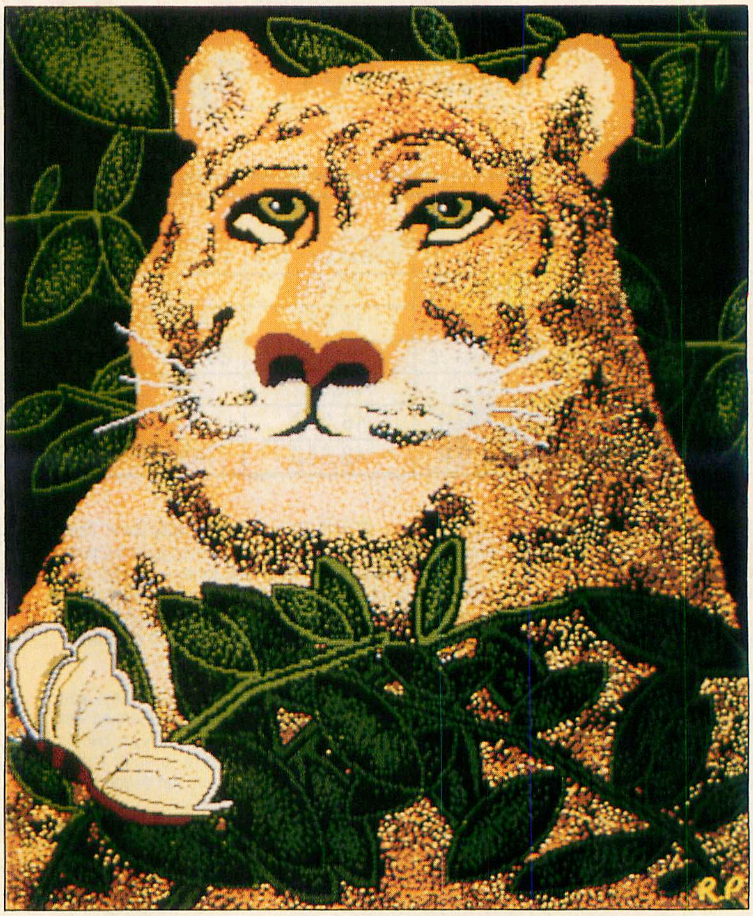
Telewriter 128 is a trademark of Cognitec. Word Power 3 is a trademark of Microcom Software.

CoCo Gallery

1st Prize
CoCo 3

Richard Perreault
Tiger

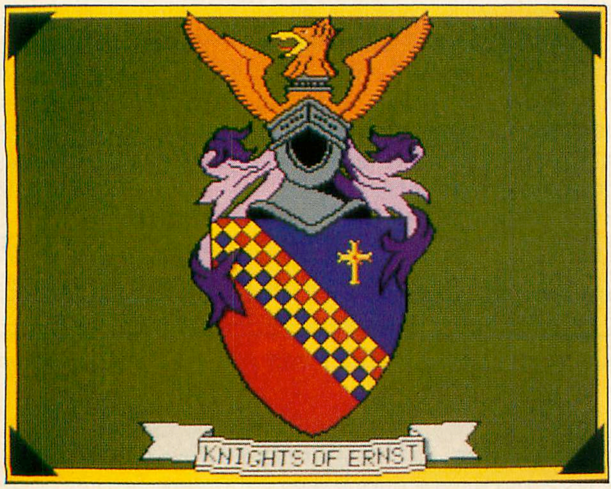
Richard, a student in Boucherville, Quebec, used *CoCo Max III* to develop this view of this fierce, flesh-eating native of Asia. Richard enjoys skiing, fishing and computing.



3rd Prize

Robert Williams
C-O-ARMS

CoCo 3 BASIC was used to create this scene. Robert has been using a CoCo for four years, enjoys role-playing games and lives in Lucasville, Ohio.



1st Prize
CoCo 1 and 2

Mark Winship
Spacecraft

Deskmate and the CoCo 2 were used to illustrate Mark's idea of a traveling spacecraft. He lives in Houlton, Maine.

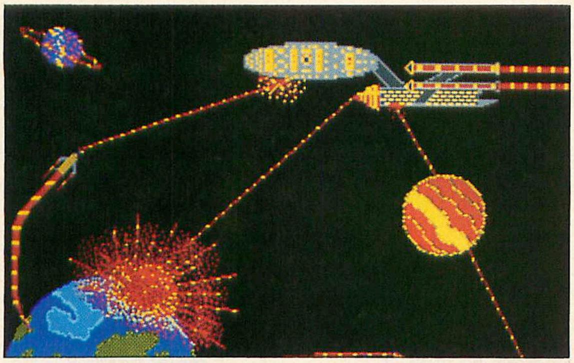
SHOWCASE YOUR BEST! You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means *no* game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award two first prizes of $25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of $15 and one third prize of $10. Honorable Mentions may also be given

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

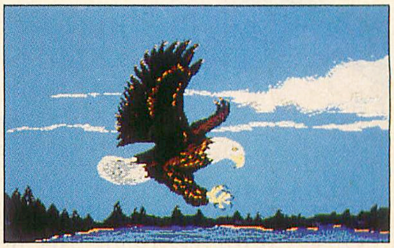
— Angela Kapfhammer, Curator



2nd Prize

James Farmer
Starship

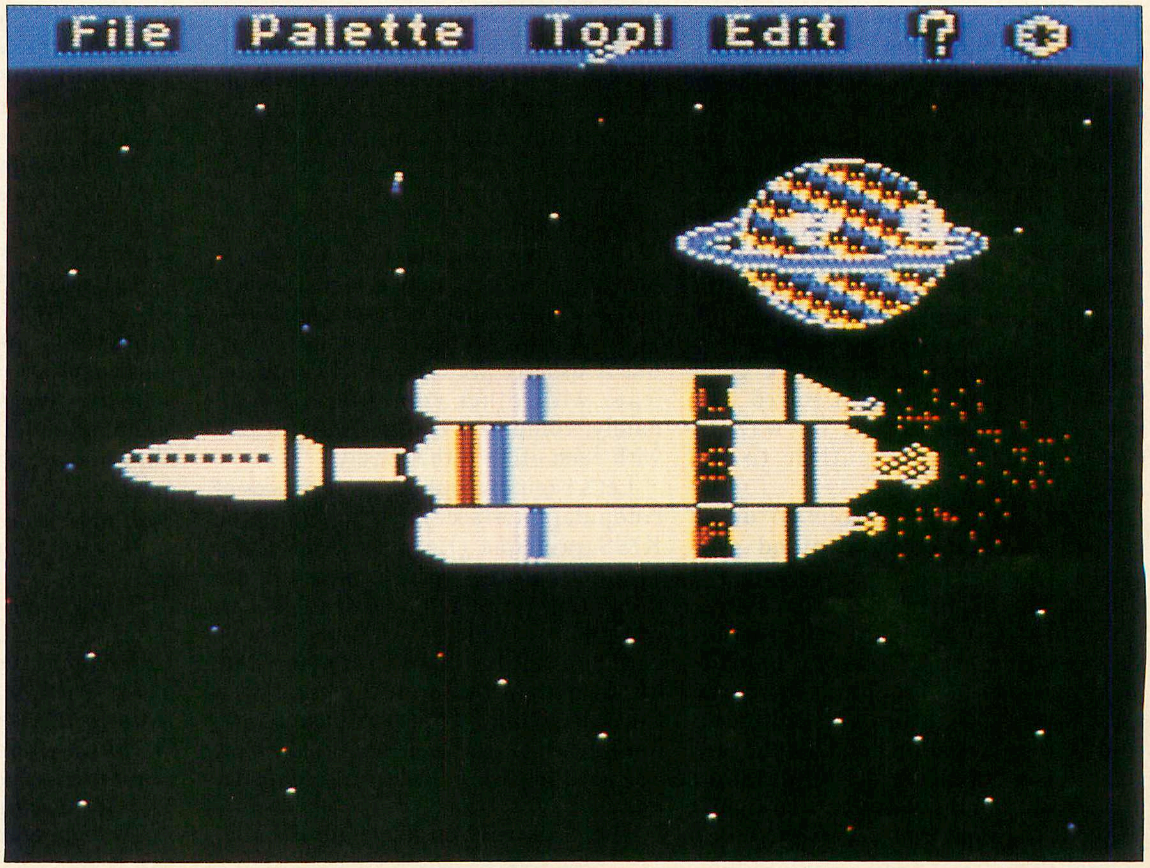
This animated scene was developed with *CoCo Max III*. James lives in North Charleston, South Carolina.



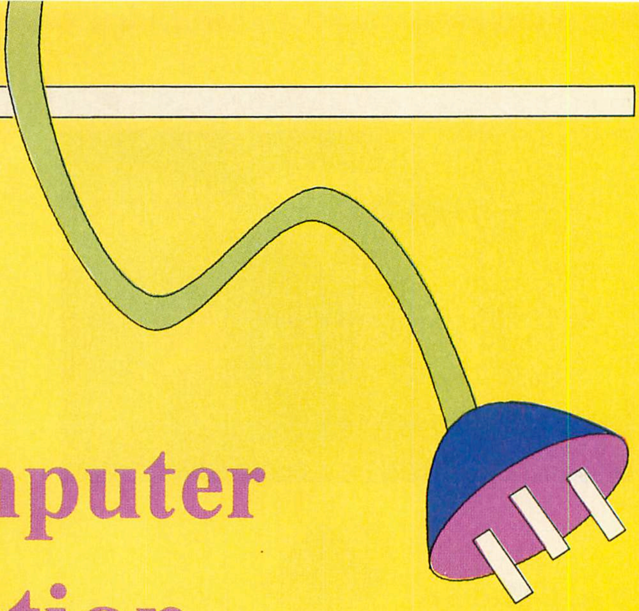
Honorable Mention

Wally Mayes
Eagle

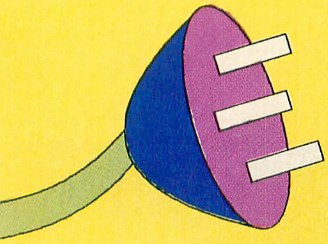
Wally, a machinist in Hamilton, Ohio, used *CoCo Max III* to develop this depiction of the national emblem.



Connecting a CoCo to other computers



The Computer Connection



By Don Hutchison

When I travel, I like to use my portable Tandy 102 both to stay in touch with Delphi, and to generate short messages and text files for articles, Delphi Mail, Help notes, etc. I enjoy the convenience of using the 102 almost anywhere. Sometimes, I sit on my sofa and use the 102 while watching TV or talking on the phone. I am sure that there are many others who like the 102 for the same reasons.

In the past, however, I felt restricted by my portable's inability to format. I wanted to transfer the text to my CoCo 3 to use its word processor for cleanup, formatting and final printing. I also wanted to transfer PCM ON DISK programs from my PC compatible to my Tandy 102. I began looking for a way to transfer programs from my PC compatible to my 102. Once I solved that problem, I began looking for ways to connect the PC compatible to my CoCo.

There are many reasons to use a second computer to download programs. You may choose to use your PC compatible because it has a hard drive or because your IBM terminal program provides support for *batched* uploads and downloads. (This option allows the transfer of multiple files with little or no operator intervention, and if you are paying for access to an information service, the time savings can be significant.) Programs that are downloaded onto your PC compatible can be transferred to your CoCo at your leisure by using the techniques described in this article.

Although you won't be able to transfer MS-DOS programs to your CoCo and expect them to operate correctly, the CoCo and the PC compatible are now connected in a manner that allows them to communicate. If you prefer to download programs from Delphi onto a hard drive, there is now a convenient way to transfer the files to your CoCo.

Background

Generally, computers are not sociable things. Indeed, they prefer to be left alone. A computer chooses one owner and will do what that owner asks of it, but it usually prefers not to communicate with other computers. Fortunately, computers can be made to talk with each other rather easily.

Let's begin by looking at the basics of computer interface. I'm a big fan of the KISS principle (Keep It Simple and Straightforward) so I looked for the minimum equipment needed to get two computers to talk to each other. Simple communications like the ones we'll be discussing are based on the use of just three signal lines: a line on which to *talk*, one on which to *listen* and a *common* line for the sake of electrical completeness.

There are two complementary configurations for the standard RS-232 interface: DTE (Data Terminal Equipment) and DCE (Data Communications Equipment). As the name implies, Data Terminal Equipment consists of those devices operating as terminals, and Data Communications Equipment is comprised of those devices designed to communicate with the outside world. The two devices are actually *designed* to be directly connected to each other.

A modem is a typical example of DCE gear, and portable computers, such as the Tandy 102, are examples of DTE gear. When a computer is imitating, or *emulating*, a terminal, it is configured to operate as DTE.

Although this sounds complicated, all we are defining is how a computer *listens* for information and *talks* to other devices. For example, DTE hardware uses Pin 2 to send data, and DCE equipment uses that pin to receive data. So, when the two devices are connected, one talks while the other listens. In fact, both units can be talking *and* listening at the same time. Humans should be so lucky.

To get your CoCo to communicate

Don Hutchison is an electrical engineer living in Atlanta, Ga. He works as a senior project engineer and is involved in the design of industrial control systems. On Delphi, Don is the Database Manager of the RAINBOW SIG. His Delphi username is DONHUTCHISON.

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with another computer, you only need to run a cable between the two computers, using the necessary adapters. In addition, these computers will run the terminal program of your choice.

Communicating with Another CoCo

It is probably easiest to get CoCos to communicate with each other because, like their owners, CoCos are pretty gregarious. They like to get together and communicate, especially online on Delphi and at RAINBOWfests. They even exchange pictures.

It's a simple matter to connect two CoCos by using a cable to connect the two serial ports. Just *crisscross* the send-data and receive-data lines. In other words, connect the send-data line from one CoCo to the receive-data line on the other, and vice versa. When one CoCo talks on a signal line, the other CoCo listens.

To construct the necessary cable, use two four-pin DIN plugs (Part No. 274-007) and a suitable length of cable. The cable itself is not usually crucial in short-to-intermediate lengths, such as six to 15 feet. Electrically, the cable would follow as shown below:

	CoCo 1	**CoCo 2**
Receive Data	2	4
Signal Ground	3	3
Transmit Data	4	2

The Carrier Detect (CD) function, Pin 1, is not needed for most CoCo terminal programs. Although the popular terminal programs *GETerm*, *Mikeyterm* and *Rickeyterm* do *not* require a carrier detect signal to operate, some terminal programs *do* require the carrier detect line to be active. Because this function is normally provided by the modem, you must take steps to provide the carrier detect signal if you choose to use such a terminal program. Usually, the CD signal can be activated with a signal (such as DTR) that is obtained elsewhere.

After the computers are physically connected, simply load and run your favorite terminal program on each computer. This will allow you to transfer files back and forth. Pretty simple, huh?

I generally use the CoCo's standard four-pin DIN serial port for this type of communication because it is convenient. The serial port (on any model of CoCo) is adequate for the short files I transfer, and it usually operates reliably at speeds up through 1200 bits per second. The CoCo 3 is capable of operating at 2400 bits per second through the serial port; however, I've been able to use only 300-baud communications under OS-9 because of the increased system overhead.

Remember that several terminal programs will automatically sense the presence of an RS-232 pack, so remove it from your system before running the terminal program. *GETerm*, *Mikeyterm* and *Rickeyterm* all *auto sense* the RS-232 pack.

Remote Connection under OS-9

OS-9 offers a unique method for connection through the serial port. This operating system allows you to use a separate terminal (such as a Tandy 102) to access OS-9. When you are connected to OS-9 in this fashion, you can type on either the main CoCo keyboard *or* the remote keyboard. OS-9 will honor requests from either source. Although some things can't be done from the remote keyboard (like showing windows on a Tandy 102), it's still fun to use.

To link to OS-9, execute the `XMode` utility to configure the serial port for use with an external terminal. To configure the port for 300-bps, 8-bit, 1 stop bit, no parity, just enter the following:

```
xmode /t1 type=0 baud=1
```

Next, invoke `TsMon` (the Timesharing monitor) with the following line:

```
tsmon /t1 &
```

This tells OS-9 to start up `TsMon` as a concurrent process. At this point, press ENTER from the remote terminal or keyboard to initiate the OS-9 login sequence. If you successfully log in to the system, you'll be greeted in the following manner:

```
WELCOME TO COLOR COMPUTER
OS-9
OS9:
```

When asked for a username, press ENTER again. OS-9 will initiate the appropriate steps to enable access to the system.

I've found this a quick and convenient way to extract text files from an OS-9 disk onto another computer. Simply display the file(s) by entering the `LIST` command from the remote terminal or keyboard, and capture the text as it's displayed.

A better way to transfer files to and from an OS-9 disk is to use an OS-9 terminal program like *XTerm*. This method works better because the system overhead is too great to allow the operating system to service the serial port as often as required when using `TsMon` with `/t1`. The CoCo's serial port is not very useful under OS-9 at speeds above 300 bits per second.

This method is useful for those wanting to extract OS-9 text files from their CoCos and use them with portable computers. It's also convenient for those who prefer a Disk BASIC word processor like *Telewriter*. The text files can be edited using the method of your choice. However, don't forget that it isn't possible to transfer OS-9 binary files to a portable (or vice versa) and expect them to function correctly.

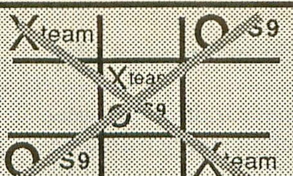
Using RS-232 Packs

Because the CoCo uses nonstandard connectors for its serial port, we'll need to look at ways we can communicate with devices that use standard connectors and interface requirements. I refer to the CoCo's serial port because this port is not a true RS-232 port. The RS-232 standard defines both signal levels and the control signals that should be present. Fortunately, the serial port is compatible enough to let us communicate with a wide variety of RS-232 devices.

It is easy to initiate communication between two CoCos if both are using RS-232 packs. Rather than using the cable described above, you'll use a standard RS-232 cable with male DB-25 connectors on each end. Your local Radio Shack sells the cable (Part No. 26-1408). Although it is called an RS-232-C cable for Model III/12, we will be able to use it with our CoCos.

We will also need a small device called a null-modem adapter. That's a rather intimidating term for a simple adapter that is used when no modem is available (hence the name null modem). The advantage of this device is that you can use the cable with your modem when communicating with Delphi, then unplug the cable and use it with a null-modem adapter to interface with another computer. Radio Shack sells a suitable null-modem adapter (Part No. 26-1496) for under $10.

XTEAM & OS-9



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A null-modem adapter is just a small box with a DB-25 connector on each end and some internal wiring to facilitate communication between two devices. The adapter connects the necessary control signals of each computer to simulate a connection with a modem or other DCE device. Additionally, the adapter crisscrosses the send-data and receive-data lines so each computer can send and receive data on the appropriate lines. Without this adapter, things would be a bit more complicated.

To use this adapter, plug one end of the RS-232 cable into one of the RS-232 packs, plug the other end into the null-modem adapter, and insert the adapter into the second RS-232 pack. Crank up your favorite terminal program on each computer, and the two computers are directly connected and ready to communicate.

Different Computers

Most computers use a standard DB-25 connector to interface with the outside world. This is what I use when I want my Tandy 102 to talk to my Color Computer. To connect another computer to the CoCo's serial port, we'll need to construct a suitable cable. Specifically, we'll need a CoCo four-pin DIN plug on one end of the cable and a standard male DB-25 connector on the other end.

It is sometimes possible to find a usable cable at your local Radio Shack, but it is no longer a standard catalog item. If you choose to construct your own cable, here is the necessary equipment:

Function	CoCo DIN Plug	DB-25 Connector
Carrier Detect	1	-
Receive Data	2	3
Signal Ground	3	7
Transmit Data	4	2

The Tandy 102, like many other computers, uses a maximum of seven pins in its RS-232-C interface port. The additional functions of Request to Send (RTS), Clear to Send (CTS) and Data Terminal Ready (DTR) are seldom required for the simple communications interfaces we're using. When we use a true RS-232 port, however, these signals must be properly connected. This is the function of the null-modem adapter.

You'll find some variation between the different computers regarding required control signals, so it's always best to consult the owners manual for each machine. If the other computer simply refuses to begin communication with the CoCo, experiment by connecting the DB-25 connector's Pin 20 to Pin 8. This sometimes forces the other computer to acknowledge a carrier detect signal, which in turn allows it to function correctly. Your owners manual should explain this.

As we did earlier, connect the two computers with the cable and null-modem adapter. Plug the DB-25 connector into the null-modem adapter, and plug the adapter into the other computer. Insert the four-pin plug into the CoCo's serial port and start up the appropriate terminal software for each computer.

If you choose to use your RS-232 pack to talk with the other computer, simply use the RS-232 cable and null-modem adapter as you would when using two RS-232 packs.

MS-DOS Machines

Interfacing to the PC-compatible machines involves a little trick, but the technique is still nothing exotic. Because the PC compatibles use a male DB-25 connector rather than a female connector for the RS-232 port on the rear of the computer, you must purchase a "gender-changer" adapter, which is available from Radio Shack for $7.95 (Part No. 26-1495). Use this with the null-modem adapter and either of the cables described (depending upon your particular hardware).

The shareware program, *ProComm*, is probably the most popular terminal program for the MS-DOS engines, yet it requires a little trickery to get it to work without a modem. We need to convince the terminal program that the carrier detect is active (as it would be if we were using a modem).

The easiest way to do this is to install a jumper from Pin 8 to Pin 20 inside the cable connector attached to the PC compatible. This jumper connects the DTR line from the PC compatible (normal when using *ProComm*) to the carrier detect (CD) input. At this point, *ProComm* is ready to communicate with the other computer. This type of trickery may be required when using other PC terminal programs as well. Check the documentation to be sure.

General Notes

Of course, hardware hackers will notice that a null-modem adapter could be incorporated into the design of the cable, and that a gender-changer isn't required for use with MS-DOS machines if you choose to replace one connector with another. However, the intent here is to use standard adapters and make the techniques available to most users.

If you plan on interfacing with a lot of other computers, I recommend that you purchase an RS-232 Mini-Tester from Radio Shack. This small unit, priced at $14.95, is a great time-saver. It gives a quick visual indication of the state of each line in the RS-232 interface using red and green LEDs.

It's usually wise to use terminal settings of 8-bit, 1 stop bit and no parity on each computer, because some terminal programs will not automatically adjust to these settings before beginning a file transfer. (These settings are required when using the popular file transfer protocol, Xmodem.) You must also use the same baud-rate setting between the two computers, or communications will be totally garbled and impossible.

Half-duplex operation is usually preferred, especially if two computer operators will be typing back and forth to each other. In half-duplex mode, the terminal software will *echo* each keystroke to its operator. On the other hand, if the computer is operating in full-duplex mode, the operators will type *blind* because they will have no way of seeing the characters they are typing.

If the two computer operators intend to type to each other, it's also wise to adjust the terminal settings to *insert-linefeeds* mode. If this isn't done, the lines may overwrite each other on the screen. The documentation for the particular terminal program will explain how to do this.

Finally, use protocol transfers *whenever* possible. Even when transferring ASCII text files, it's best to use an error-checking protocol such as Xmodem to provide maximum protection from errors.

Now you can connect your CoCo to your PC compatible. Enjoy the benefits of both machines with a wider selection of files.

New faces, new places and a discussion on computer viruses

Haven't I Seen You Before?

By Don Hutchison
Rainbow CoCo SIG Database Manager

Effective this issue, I will be assuming responsibility for "Delphi Bureau" from **Cray Augsburg** (CRAY). Cray has been writing the column since April, 1986, and now retires with our thanks. Don't worry. Cray will remain as the technical liaison between Delphi and THE RAINBOW. If you have a topic that you would like covered in this column, please contact me through Delphi's Mail system under the username DONHUTCHISON.

Person To Person

Delphi's newest SIG, Person To Person, is now open. This newest SIG is intended as a place for people to meet. It is accessible from the Entertainment menu, and can be found by typing `GO ENT PER` from almost anywhere in the Delphi system. SigOp **Shannon Yoffe** (SHANNONY) cordially invites everyone to stop by. Just sit anywhere.

One of the features of Person To Person will be the photo library. We're encouraging our members to post pictures of themselves in the database for others to view. Naturally, not everyone can digitize his or her own picture, so we have arranged for that to be handled for you. **James Farmer** (MODEMMASTER) will be more than happy to digitize your photo and post it in the SIG's database. James just needs a good photograph (the bigger the better), and he'll take it from there. Send your photo to James Farmer, 5311 Barwick Road, N. Charleston, SC 29418. If you want your photo returned, please include an SASE suitable for photos. Remember to add at least one sheet of cardboard or some other stiff material so your photo won't get crushed or bent in the mail.

James also invites calls from those who want more information about digitizing. You may contact him at (803) 552-2837. Please remember that this is in the Eastern time zone, and avoid calling during odd hours.

The Portable Place

After a bit of restructuring, the Portable Place is now open under the sponsorship of PCM. The Portable Place is dedicated to laptop computers such as the Tandy Model 100/102, 200 and 600, and the NEC portables. SIG staffers include **Marty Goodman** (MARTYGOODMAN) as house doctor, **Jim Reed** (JIMREED) as key grip and me as chief engineer. We cordially invite you to stop by.

In cooperation with PCM, THE RAINBOW's sister publication, we will have available the programs for portables from PCM ON DISK. We plan to post these files each month in a special topic of the database, where they will be available for instant access via downloading. These programs will each carry a $3 surcharge.

View Master

David Mills (DAVIDMILLS) has posted an outstanding graphics-viewing utility on the CoCo SIG. David's program, *View Master*, allows a CoCo 3 user to view most popular types of pictures using a *single* program. No more scrambling around when you want to view a particular picture — just run *View Master*. Look for it in the CoCo 3 Graphics topic of the CoCo SIG's database, and in the General topic of the database inside People To People.

Viruses

Lately, there has been a lot of publicity about the computer hazards known as *viruses*, *time bombs*, *Trojan horses*, etc. Do viruses really exist?

Yes, definitely. Some, of course, are tamer than others. We've all heard stories about a bank programmer who installed a short program into the bank's system which transferred fractional-cent values into his own account. When discovered, he had more than $30,000 in his account, which had accrued simply from the interest calculations on passbook savings accounts.

Don Hutchison is an electrical engineer and lives in Atlanta, Georgia. He works as a senior project engineer involved in the design of industrial control systems. On Delphi, Don is the Database Manager of the RAINBOW CoCo SIG. His Delphi username is DONHUTCHISON.

Database Report

The General Information topic of the database includes **Chris Burke** (COCOXT), who uploaded a product announcement for Burke & Burke's new *RSB* (which lets you run Disk BASIC programs under OS-9 Level II), and **Brian Wright** (POLTERGEIST), who uploaded a text file that describes some bugs in the Microware C compiler.

In the Applications topic of the database, **Paul Jerkatis** (MITHELEN) posted a *Star Trek* program in BASIC09. **Robert Grubb** (GRUBBY) uploaded a BASIC09 program for determining loan payoffs, and **Steve Clark** (STEVECLARK) posted an electronic mail system — including the source code.

In the Utilities topic, Brian Wright provided us with a disk editor for OS-9 Level II, which was written by Pete Lyall. **Jeff Blower** (SEBJMB) posted *SetColor*, a utility that enables the user to change foreground, background and border colors by pressing a single key. **Mike Stute** (GRIDBUG) posted a clever utility called *Insulter*, which randomly displays insults to the user, and **Brian White** (BRIANWHITE) sent us a program that will duplicate a file or directory at another location on the same device. It uses an OS-9 feature not implemented by other commands.

Brian Wright also uploaded a text file by Pete Lyall in the Patches topic of the database. This file describes how to modify the RS-232 pack to enhance telecommunications or use with an external terminal. Brian posted another file from Pete Lyall that will patch `ACIAPAK`'s variable

However, authors of viruses for personal computer systems are probably out to destroy your data.

Just what *are* these things, and what can we do about them?

A computer virus is usually a small program that is hidden in some manner. (It may even be a part of a larger, innocent-looking Trojan horse program. An earlier name for computer viruses was *worms.*) A virus has the ability to duplicate itself and to travel to another computer through the transfer of disks or by electronic means. It may have the ability to hide within your computer for days, months or even years before activating itself. Maintaining good backup procedures doesn't prevent viral spread, because a timed release virus can also be in the backup disk or tape. Therefore, the virus is capable of destroying your data time after time.

Although Trojan horses are usually programs designed to transmit a virus into computer systems, they may be destructive programs on their own. Just as the ancient Greeks captured Troy by hiding hundreds of soldiers inside an innocent-looking wooden horse, such a

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space to allow more efficient I/O at speeds above 1200 bps. **Merle Kemmerly** (TOOK3) posted a patch, for ACIAPAK under Level II, that increases the input buffer to 140 bytes to help those operating at the faster baud rates. **Dave Philipsen** (DPHILIPSEN) posted a file to fix the seven-bit Xmodem bug in version 1.0 of the terminal program, *SuperComm.* For the *Microscopic Mission* game Robert Grubb posted a patch file that allows the game to run from the current execution directory. (This also allows it to run from a hard disk.) **Larry Oheron** (LOHERON) sent us a file describing how to set up *DeskMate 3* to run from a single disk.

The Telcom topic gives us Merle Kemmerly, who uploaded Version 3.2 of the popular terminal program *Telstar*; **Jim Hollier** (PGJIM), who posted Version 3.1 of *Jterm*; and Dave Philipsen, who uploaded *SuperComm.*

In the Graphics & Music topic, **Mike Knudsen** (RAGTIMER) uploaded his arrangement of a familiar tune. **Dennis Weldy** (OS9ER) uploaded a revised version of QuadDump, a printer driver for the Quad Jet color printer. Steve Clark posted a tongue-in-cheek drawing of the Color Computer and its Multi-Pak Interface.

The Programmers Den topic includes Brian Wright, who uploaded a file that describes the inner workings of the *Citadel* BBS package and the source code for that package. Mike Stute uploaded Part 2 of the C standard library.

In the Tutorials & Education topic, Mike Stute sent us an article on dynamic allocation and doubly linked lists. Brian Wright uploaded a tutorial on OS-9 concepts, while **Andrew Ellinor** (CROPPER) sent us his text file containing an introduction to OS-9. **Kevin Darling** (KDARLING) posted a text file concerning the Multi-Pak Interface and the Deluxe RS-232 Pak.

CoCo SIG

In the CoCo 3 Graphics topic, **Mark Garbarini** (F19) posted a picture of a sunset. I uploaded the CoCo Gallery Live pictures from the Chicago RAINBOWfest. **Donald Ricketts** (STEVEPDX) uploaded approximately 60 digitized images that he had converted from DS-69B format into *CoCo Max 3* files. Donald's pictures are always quite popular. David Mills posted a *very* popular viewing utility that will allow its user to view *all* major types of picture files. David also uploaded another adult picture from Brad Bansner. **John Barrett** (JBARRETT) posted several pictures of his favorite rally cars, and **Richard Trasborg** (TRAS) uploaded over one megabyte of clip art for use with *Max-10.* These files, drawn by Mike Trammell, have been very popular.

The Source for 6809 Assemblers topic of the database gives us **Mike Ward** (MIKEWARD) uploading the source code that details how to perform disk I/O from assembly language. This file will be extremely popular with all aspiring assembly language programmers.

In the Utilities & Applications topic, **Stephen Macri** (DRACMAN) uploaded his *Alicia Calendars* programs. **Robert Pierce** (RPIERCE) posted a revised version of his popular disk editor and a 51-by-24 Hi-Res screen driver for the CoCo 1 and 2. **Tom Wyrick** (WYRICK) uploaded a program to assist in converting CoCo BASIC programs into IBM-compatible ones. **Mike Sweet** (DODGECOLT) sent us his favorite disk editor, and **Jim Shoop** (BAZAR) uploaded a patch for *MAX-10* to eliminate the need to use the "clicker." While Brian White posted a high-speed disk backup utility, **Pierre Salvail** (PSALVAIL) sent us a useful smooth-scrolling utility for the CoCo 3. **Seth Short** (SETHSHORT) provided a universal picture conversion utility. **Fred McDonald** (FREDMCD) sent us a program for printing large banners on your printer and a search program for cross-referencing BASIC programs. Richard Trasborg uploaded a VCR tape-cataloging program written by his wife. Finally, **Billy Passauer** (INDIANABILL) uploaded Version 1.5 of the *File Copy Express*, a utility that allows wildcards during the copy operation.

In the Hardware Hacking topic, Marty Goodman sent us a file describing a bug in the RS-232 Pak and how to fix it. **Bob Smith** (HIBARBAREE) sent us a file describing how to use a Diablo printer with the CoCo, and Robert Pierce sent us a *CoCo Max 3* picture containing a CoCo 3 memory map.

The Games topic includes **Colin McKay** (COLINKCKAY), who uploaded his *Racko* and *Sea Battle* games, and Tom Wyrick, who posted a dart game and a *Wild Party* game.

In the Classic Graphics topic of the database, Tom Wyrick uploaded his graphics editor, and I was busy posting the CoCo Gallery pictures for September '88, as well as those published from October '85 to May '86.

The Music & Sound topic gives us **Mike Carey** (SPOOLFRAME), who uploaded fifteen more of his very popular *Lyra* files, and Mike Stute, who posted two more of his personal favorites.

In the Product Reviews & Announcements topic, Chris Burke uploaded a product announcement for the new Burke & Burke *RSB.* Donald Ricketts posted his review of the CoCo 3 version of *VIP Database.*

In the Data Communications topic, Tom Wyrick uploaded a data communications course composed of several BASIC programs, and a driver package for would-be BBS SysOps. **Robert Combs** (ROBCOMBS) uploaded two versions of *Phone Clone*, one for each model of CoCo 3. Rob also sent us *MultiLink*, a program to link the serial port with an RS-232 pack and enter a CB mode. Donald Ricketts uploaded a patch for *Ultimaterm* to adjust the program for 40-track disks.

program can wreak havoc within your system.

Another hazard, the time bomb, is a program that *blows up* a computer system after a certain interval of time following its installation. A programmer who was fired from a company might leave such a bomb in the system as a form of revenge. These bombs may do relatively simple things (like displaying a clever message on the programmer's birthday), or they may maliciously destroy thousands of important records. Some time bombs will activate themselves at repeatable intervals (like every two or four days after a disk has been infected). The results are varied, but they may include any of the following: printer/display problems, system crashes, or the malfunction of peripherals.

Viruses have been reported for all major brands of computers. Currently, those with IBM compatibles are the most vulnerable, but the potential threat is very real. One factor on our side is that viruses must be specific to the particular machine. (For example, an IBM virus cannot install itself into a CoCo environment.)

In practice, a user is not totally safe unless he never uses his computer. The possibility of a computer viral infection cannot be completely eliminated.

While there are all sorts of infectious agents that can invade your computer, the CoCo is more resistant to such attacks than many other machines. Because the CoCo uses a ROM-based operating system and the system exists as unalterable firmware, permanent change is virtually impossible. This provides a great deal of security for most CoCo users.

The CoCo 3 is a slightly different case since the operating system is transferred to RAM at start-up. This makes it vulnerable to modification by a virus program. It would be rather easy, for example, to patch the CoCo 3's operating system and destroy the allocation tables and/or directory of a disk after a certain time or after a certain number of disk accesses. Fortunately, the CoCo 3's operating system is "refreshed" at each cold start, so a virus couldn't live permanently in this system as it could on other systems.

Those of you using OS-9, however, *are* susceptible to viral infection. Because OS-9 is a disk-based operating system, it is as vulnerable as MS-DOS or any other disk-based operating system. At present, there are no authenticated reports of a CoCo *OS-9 virus*. Much of this can be attributed to the CoCo OS-9 user, who is usually more interested in the operating system itself rather than in childishly damaging someone else's system.

Although real viruses have been created for MS-DOS machines, these are somewhat rare. Generally, when someone *thinks* a problem is due to a virus, it is actually due to software misuse, damaged software or a hardware failure of some sort.

Since viruses can be created to merge with and contaminate the operating system in any of a number of ways, there does not seem to be any practical means of "protecting" our users against possible viruses. All we can do is carefully examine any report of problems that might be associated with a program someone has downloaded from the database. Please notify the SIG staff if you suspect a program may be other than what it appears. We'll all be glad to help out.

See you online on Delphi!

The CoCo XT and CoCo XT-RTC Hard Disk Interfaces

The CoCo XT interface uses advanced "NO HALT" hard disk controllers, which do not halt your CoCo and do not disable or use interrupts during hard disk access. You get full type-ahead, and the system clock does not lose time during hard disk access. Fully compatible with most RS-232 expansion ports!

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So You Want to Be a SysOp

By Dave Jenkins

Many bulletin board users consider becoming a System Operator (SysOp), and some will start BBSs. Often, however, these new SysOps grow discouraged by the unanticipated problems and time demands of a properly running BBS. This article is intended to help the prospective SysOp make an intelligent decision.

As a potential SysOp, you must have the right personality and experience before going online. You need the patience to answer questions from users. Perhaps you've answered that same question a hundred times before, but the person asking doesn't know that. You also need to know how to program, and how to use such things as a disk zapper. A little electronics knowledge can also be helpful.

You should have plenty of spare time — being a good SysOp takes a lot of time. I spend about an hour a day working the system, and an additional two or three hours updating files on Sunday mornings. Because most people don't have a large enough system to adequately run a BBS, you may need to update your equipment, so you'll need some money. You'll also need a second telephone line, which (depending on where you live) can be expensive.

Before you decide to put a BBS online, you should ask yourself if you really want to do this. Don't answer too quickly. Remember

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Dave Jenkins is an engineer at WNIN-TV/FM in Evansville, Ind. He has been a System Operator for four years and is BBS section leader on Compu Serve's CoCo Forum.

that your computer will be tied up while the BBS is online. When you want to use the computer, someone will probably be online. If you are into gaming, or use your computer for many other things, you will probably regret starting a BBS.

You must also remember that most areas have several BBSs. If you want to be a success, you must find a need and fill it. Don't duplicate the other BBSs in your area. Find out what is needed in the community and do that. For instance, in my area no BBS supported graphics in a format that several computers could use. I started putting RLE (run length encoded) graphics online. These can be viewed by almost all the popular home computers. This has been very popular, and other BBSs in town have started posting RLE graphics as well. You might also want to offer online games, role playing games, specialized message bases or downloads.

Choosing Hardware and Software

You need to decide what hardware and software to use. If you have a spare computer system sitting around gathering dust, it would be a prime candidate to run your BBS. I don't suggest putting new hardware online until you are certain that it works properly. An online BBS is a poor place to discover manufacturing defects.

If your software supports it, I recommend going with a 300/1200-baud modem. The 1200-baud modems cost less than 300-baud modems did just a few years ago. About one-third of the users on my system are 1200 baud, and more are moving in that direction. (In fact, if your hardware and budget can support it, I would go with 2400-baud service.) You should support at least 300- and 1200-baud modems. Get a fully Hayes-compatible modem. The Hayes command set has become a de facto standard among modems, and it cannot hurt to follow the standard. You may be able to get by without it, but it may hinder a future upgrade. It is cheaper to buy it now than to buy a second modem later.

You can find BBS software in two ways: shop for commercial BBS software or download free BBS software from Delphi or other networks. In either situation, talk to SysOps who use the software for an accurate judgment of the software's quality. Software sold commercially is not necessarily bug-free. Call running BBSs to get a feel for the software from a user's standpoint. No matter how you find the software to run your BBS, it should support Xmodem up- and downloading. Your system will be severely restricted without it.

A good BBS should have at least four drives. Although I have run systems with two drives, and you can start at that point, you should expand to as many drives as possible. No BBS in existence has too much storage space. The more you have, the more you can offer your users. Plan to continue upgrading your system.

A 64K CoCo makes an excellent BBS computer, particularly when it is outfitted with the RS-232 pack. A 512K CoCo 3, which allows two RAM disks online, is also an excellent choice. My system is a 512K CoCo 3 with a Multi-Pak Interface, an RS-232 pack, four floppy drives and an Avatex 1200 modem. My future upgrades will include moving to either double-sided or quad-density disk drives and the OS-9 operating system. The upgrading never ends.

You might want to buy a used system from someone for your BBS. If you can find the right package deal, you can get a system going for a reasonable price

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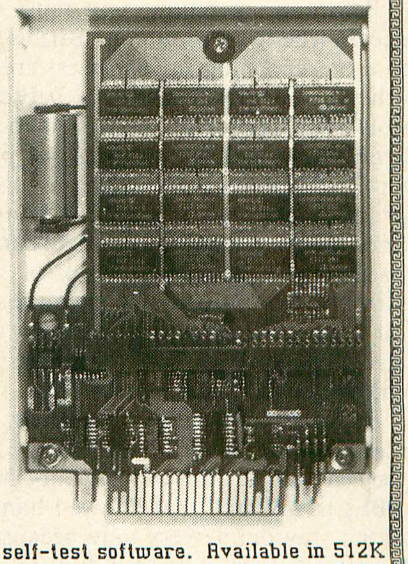

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and keep your CoCo as your main computer. Don't rule out systems from other manufacturers. You might find a great bargain and learn something in the process.

Getting a Telephone Line

Many new SysOps try to begin running their BBS on their residence telephone line. I do not recommend this practice. Some users will ignore or forget your hours of operation and call when the BBS is down. And, while your BBS is online, no one can call you.

Telephone company rules vary widely from area to area. Some companies try to charge BBSs business rates instead of residential rates. Try to get *measured service* for your BBS line. Measured service limits the number of free outgoing calls and adds a surcharge for each call made beyond that number. Since most, if not all, calls will be incoming, this should not be a problem. Please remember that some telephone companies will not allow a measured service line in your home if you also have a standard line.

You can save money on installation if you can do your own interior wiring. Telephone wiring is not difficult. There are several books available that explain how it is done. Our telephone company charges $36 an hour for installation, so it pays to learn how to do your own wiring.

Before going online, you must also decide whether or not your BBS is free to the user. Charging for access creates other considerations. Every subscription BBS SysOp I have talked to has problems with users sharing one password. I know of no solution to this problem except charging for connect time. You will also have to take care of bookkeeping and keep track of subscription expiration dates. If you charge for access, the telephone company may also consider your BBS a business and charge you business phone rates.

Require that callers use their full names online. While handles can be fun, they can create a lot of problems. Most BBSs in my area that allowed handles didn't stay online very long because of troublemakers who hid behind the handle. Requiring full names reduces problems.

Ready to Go Online

Let's assume that you have the hardware and software ready and the telephone line is installed. You're ready to go online. What problems can you anticipate?

First, you can expect hardware problems. Running a BBS puts a heavy strain on your equipment. Expect to have your disk drives aligned and cleaned at least once a year. The drives are the weakest point in your system because they are the only mechanical part. The rest of your system is electronic and should be fairly reliable, unless there is a lightning strike, overheating, or some other severe condition.

Get surge protectors for the power and telephone lines coming into your system. These devices may cost you $50 to $75, but the insurance is worth the investment. If it saves you from just one lightning strike, a surge protector will have paid for itself.

Your computer should not share an electric circuit with a heavy-duty appliance (i.e., your refrigerator, washer or dryer). These devices draw a large amount of current when starting, which reduces voltage and could cause a crash. You might also look into ventilating fans for the computer, especially during the summer in a room without air conditioning. Never cover the ventilation areas while the computer is on.

Unless you absolutely need it on, turn your monitor or TV off while the BBS is in operation. The screen images can *burn into* the CRT. This damage is permanent, expensive to repair and completely avoidable. One SysOp I know bought a used black and white TV to use as a monitor. It made an adequate picture, cost little and was a good choice for the purpose. He left it on all the time, but since it cost so little, he didn't care about raster burn.

A little electronics knowledge can help keep you online. For instance, if parts have visible damage (charring or swelling), knowing how to pull the cover off the equipment, recognize a damaged part and replace it can save you money and keep you online.

Develop a good relationship with the service manager at the nearest Radio Shack Computer Center. If your problem is relatively simple to fix and you bring the unit in for repair, the service manager may expedite the repairs for you. Be subtle when you make such a request. Instead of applying pressure, tell the manager that your BBS is down and that you need your equipment back as soon as possible. If you have a good relationship with the service center (and the shop is not overloaded) your repairs may be moved ahead. Remember, though, we all feel that our repairs are top priority, and sometimes we may have to accept the wait.

Preventive maintenance is also important. Every week, you should clean your edge connectors and your drive heads to prevent corrosion. Radio Shack chose not to use gold edge connectors. You'll need to turn off everything, take the disk controller apart and clean all the edge connectors by rubbing them gently with a pencil eraser. Do the same on the back of your drives. Clean your drive heads with a wet head-cleaning system. (The dry cleaners are abrasive and their use will shorten head life considerably.)

Protecting Yourself From Trouble

You have certain legal obligations as a SysOp. You are responsible for the messages posted on your BBS. Two SysOps in my area were convicted for allowing telephone access codes to be posted. Not only did they face jail sentences, they also had to pay thousands of dollars in legal bills and had to pay the telephone company involved $3,000 in restitution. Unless you like the idea of going to jail for your hobby, avoid posting credit card numbers and telephone access codes.

If you decide to post downloads, only post software and material that you *know* are either public domain or freeware. You may not post any of the following: software from magazines like THE RAINBOW, commercial software and copyright software not authorized to be posted by the author. Many people believe that if they download something from another BBS, they may post it on their own system. That is *not* true. It is entirely possible that a SysOp could be held responsible for lost sales if software is illegally posted. The risks involved are not worth the effort. Do not post anything uploaded to your BBS until you are sure you have the right to do so.

When uploading, watch for a Trojan horse. This is software disguised as one thing that is designed to do another — usually erase your disks. I have not run into this problem in the CoCo BBSs, but there are some nasty programs floating around the MS-DOS world. Test the upload thoroughly before posting it. Don't post anything that you have not personally run, unless you are confident of the source.

If you wish to post a file from one of the commercial online services (like Delphi) check with the service in question regarding its policies. If it finds that you are violating its rules, your membership can be revoked.

Try to establish friendly relations with other local SysOps. In our area, we have formed a Council of SysOps. The purpose is to share information on problem users. In extreme instances, a user could be booted off every member system in town. We have no actual meetings. One of the boards has a message base restricted to SysOps, and we share information there. Don't war with other SysOps, if it can be avoided. Cooperation can help everyone.

I don't have a hard and fast rule about verifying users. My area doesn't have many problem users, (and the Council of SysOps keeps everyone informed about troublemakers) so I don't voice-verify unless something raises my suspicions. All users must leave their full names and addresses to gain access. Of course, someone could leave a phony name and address, and unless you verify you won't know.

You should make daily backups of your online disks. Sooner or later you will have a disk crash. I had a power line surge that wiped out all my online disks. Fortunately, I had backups from the previous night, so I went to those and left a message about "stepping into the BBS zone, moving back in time to yesterday." It is bad enough to have to use your backups, but it is embarrassing if your backups are a few days — or even weeks — old. Before going to bed, back up your disks. It is not a matter of *if* you will have a crash, but *when.* You will have a disk crash sooner or later.

Disks wear out. You can save a few pennies by buying bulk disks, but I have found that many of these wear out quickly. Computers are such popular items that discount stores often sell brand-name disks for as low as $6 per box of 10. Try to determine an average time that a disk will last on your system. Then, as a normal part of operations, replace your online disks *before* that time. For instance, if disks last eight weeks, replace them every six weeks. Keep the replaced disk for other things, but not for online use.

You may also run into a system crasher. Security is a function of software, but some BBS programs have *back doors* that allow someone to avoid the usual security. These back doors should be eliminated entirely. I am using the *CoBBS* system, which turns off the modem if BASIC is entered. I have also disabled all disk commands that are not used (such as `DSKINI`, `DOS`, `DSKO$`, `SAVE`, `COPY`, `BACKUP` and `DIR`). Even if users could get through to BASIC, they still could not read any files or even see a directory. Keep in mind, however, that no system is completely secure. Your best insurance against destruction is still frequent backups.

A Few Final Tips

If you are still interested in running a BBS, I have a few suggestions that should make the responsibility a little easier. First, don't underestimate the intelligence of your users. They deserve your respect. Second, if you're going to take the BBS down to do something else on your computer, take the BBS phone off the hook and restrict your use to an hour or so. Incoming callers will get a busy signal (which indicates that the BBS is in use) instead of a ring with no answer (which indicates that the BBS is down). Third, keep in touch with the other BBSs in your area. Call them frequently, and read their message bases to find out what is on people's minds. Finally, have fun. ☐

(Questions or comments concerning this article may be directed to the author at 1418 E. Illinois St., Evansville, IN 47711. Please enclose an SASE when requesting a reply.)

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"I cannot imagine the CoCo 3 without ADOS-3; it would not be a complete machine."
The RAINBOW, July 1987

You've moved up to a CoCo 3. A powerful new machine. Now, it's time to give BASIC a shot in the arm, with ADOS-3. Wouldn't it be nice to turn on your machine and be greeted by an 80-column display, in the colors of your choice, with your own custom startup message? To run routinely at 2 MHz (double speed) without having to slow down for disk and printer operations? This and much, much more is possible with ADOS-3, our CoCo 3 adaptation of the acclaimed original ADOS, which shares the original's virtual 100% compatibility with commercial software. After customizing ADOS-3 using the provided configuring utility, you can have it burned into an EPROM that plugs into the Disk BASIC ROM socket, or just use it in RAM as a disk utility. (EPROM + burning will cost $15-20; we provide information concerning how you can have this done.) Supports double-sided drives (35, 40, or 80 tracks). FAST and SLOW commands, auto line number prompts, RUNM command, keystroke macros, arrow-key scroll through BASIC programs, auto-edit of error line, and many more valuable features.

"ON A SCALE OF 1 TO 10, I RATE ADOS-3 A SOLID 15." RAINBOW, 7/87
Disk . . . $34.95 Original ADOS for CoCo 1 or 2 . . . $27.95 (See 6/87 RAINBOW review)
Original ADOS plus ADOS-3 .... $50.00

THE PEEPER
ML program tracer that multitasks with the target program. An excellent learning tool for the ML novice; an invaluable debugging aid for the expert. CoCo 1, 2, or 3 compatible.
Disk . . . $23.95 Assembler source listing . . . Add $3.00

MONITOR CABLES for CoCo 3
Magnavox 8CM515/8CM505/8CM643 . . . $19.95 Sony KV1311CR . . . $29.95

SPECTROSYSTEMS
11111 N. Kendall Drive,
Suite A108
Miami, Florida 33176
(305) 274-3899 Day or Eve.
No delay on personal checks • Please add $2.00 shipping • Sorry, no credit cards or COD's.

16K ECB

Reading for detail

You Can't Get There From Here

By Steve Blyn
Rainbow Contributing Editor

Many people do not realize that truly good readers train themselves to adjust their reading speed to suit each reading situation. Flexibility in approaching different kinds of reading materials requires training and practice. Like the driver of a manual-transmission automobile, a reader must learn to shift speeds at appropriate times.

A good reader learns to read faster when skimming and slower when reading for details. When skimming material, good readers do not read every word. They concentrate on reading for the thought or the main idea rather than on the indiviual words. Good readers also know that they must slow down their reading speed when details and concentration on the material are demanded. Words must be studied for their meaning; passages may have to be reread.

This month's article presents a reading exercise suitable for middle school to adult education students. Its concept and appeal are important at all stages of life, and the exercise affords practice in careful, detailed reading of a short passage.

The short story presented below requires slow, careful reading. In this age of fast food and instant anything, students often want immediate results from everything they do. It would be difficult to skim the passage below and come up with a suitable map of the story details. The story is constructed to force students to slow down and read the story carefully.

The following are the directions for this exercise and the passage to be read by the user:

Read the following short story carefully. Try to visualize the route of the car. Then draw a rough map of the route showing the landmarks that were mentioned.

Last weekend, we were driving north through a small, unfamiliar town. It was lunch time and we were getting hungry. We knew that in this town, there was a wonderful pizza restaurant on Main Street. We asked a young lady how to get there, and she gave us the following directions:

"You are now going in the wrong direction. You will be able to make a U-turn two blocks up this street. Then go south on this street until you pass a library on your left. Three blocks later, you will see a gas station on your right. Make a left turn at the next intersection. Go on for about twelve blocks until you reach the first traffic light. The road forks at the light. Take the right fork. Keep going until you reach the next crossroads. You will see a school on your left. Turn right at the crossroads, before you reach the school. You will then be on Main Street. The restaurant will be on your left a few blocks down the street."

Our program presents a low-resolution map of the story and illustrates the route that the car should take. On the left of the screen is a guide for counting the number of streets or blocks indicated.

Run the program after the student has read the story and produced a map. The computer screen is compared to the student's representation. The student should use this comparison to learn why any mistakes were made. Students may want to reread the passage after comparing their maps to the computer representation.

Have your students repeat the program after several days. You can then compare the results of the newly created map with the original. While slow, careful reading is not easily accomplished in our fast-paced society, results *should* improve with each succeeding session.

Use this program to produce other practice passages for your children or students. Alter some of the directions and make the necessary changes in the program for the new map. Better still, try to create a new town map with its own directions. We hope that you and your students enjoy and benefit from this program. See you next month. ☐

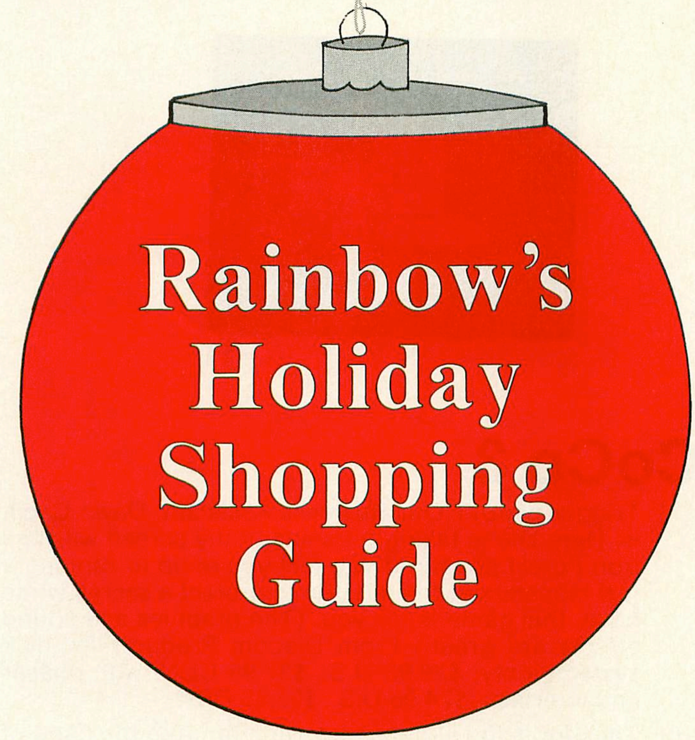
Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The listing: MAPPER

```
10 REM"VISUALIZING WHAT YOU READ
"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1988"
30 CLS0:PRINT@15,"N";
40 FOR T= 1024 TO 1530 STEP 32:P
OKE T,209:NEXT T
50 PRINT@73,"CAR";
60 PRINT@168,"LIBRARY";
70 PRINT@258,"GAS";
80 PRINT@240,"LIGHT";
90 PRINT@375,"SCHOOL";
100 PRINT@497,"PIZZA";
110 PRINT@398,"MAIN";:PRINT@430,
"ST";
120 FOR T=1096 TO 1032 STEP-32:P
OKE T,241:PLAY"L30;C":NEXT T
130 POKE 1031,241
140 FOR T=1030 TO 1286 STEP 32:P
OKE T,241:PLAY"C":NEXT T
150 FOR T=1287 TO 1298:POKE T,24
1:PLAY"C":NEXT T
160 FOR T=1298 TO 1400 STEP 33:P
OKE T,241:PLAY"C":NEXT T
170 FOR T=1247 TO 1520 STEP 30:P
OKE T,241:PLAY"C":NEXT T
180 EN$=INKEY$:IF EN$=CHR$(13) T
HEN CLS:END:ELSE 180
```

Making a list? Checking it twice? Before you send it off to the North Pole you should check out our holiday shopping guide. If you've been very, very good, you might want to treat yourself (or a deserving fellow CoCoist) to some of the goodies — ranging from $7.95 to $699.95 — featured here.

(See Page 118 for ordering information.)



Rainbow's Holiday Shopping Guide

CoCo 1 and 2

[1] Have a blast from the past with *Speed Racer*. Racer X, eat your heart out! From MichTron, on cassette and disk, $34.95. (Also works on the CoCo 3.)

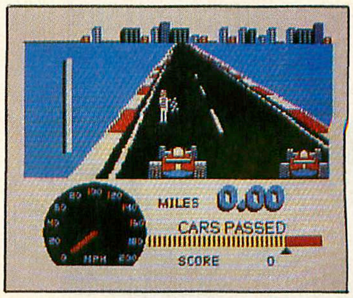
[2] Can King William *never* rest? Join him in a trilogy of Adventures from RTB Software for the CoCo 1 and 2 only — *Labyrinth* ($24.95), *Quest for the Ring* ($34.95) and *Adventure in Lumeria* ($36.95). Here he is at the beach, attempting to cross the sea to save his lady fair.

[3] Go lunar and drive for yourself an out-of-this-world set of wheels with *Moon Runner*. It's arcade action in orbit. (*Psst!*, also included is a version especially for the CoCo 3.) From Nick Bradbury, disk system only, $15.

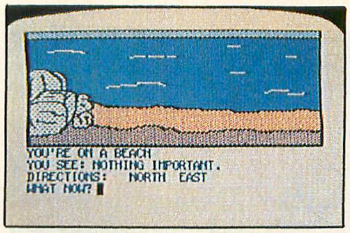
[4] Deliver the ultimate parting shot with *Car Sign Designer*. The package comes with two reusable sign holders. From Zebra Systems for 64K CoCo 1, 2 and 3 disk systems, $29.95.

[5] Are you fumble-fingered? Is your wimpy wpm getting you down? Here's the cure — *TypeMate*, a typing tutor on a ROM pack from Tandy (also works on the CoCo 3). Available in Radio Shack stores nationwide for $24.95.

[6] Get a handle on CoCo 1, 2 and 3 data storage with Burke & Burke's *Hyper-I/O* ($29.95), a program that allows the use of 3½-inch floppy drives and hard drives under Disk BASIC *and* OS-9.

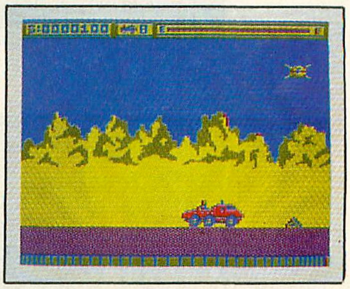


1



```
YOU'RE ON A BEACH
YOU SEE: NOTHING IMPORTANT.
DIRECTIONS:    NORTH  EAST
WHAT NOW?
```

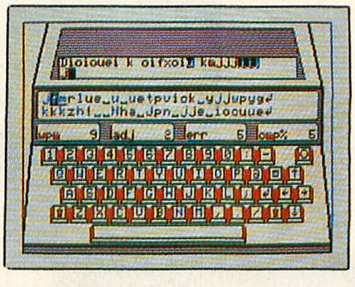
2



3

USER MANUAL
CAR SIGN DESIGNER

4



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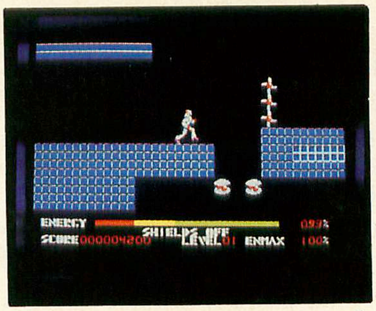

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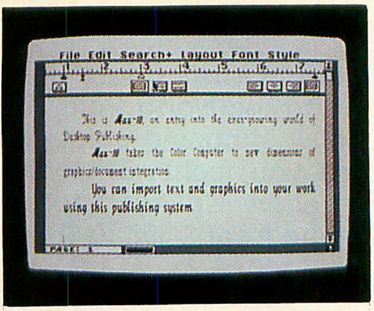
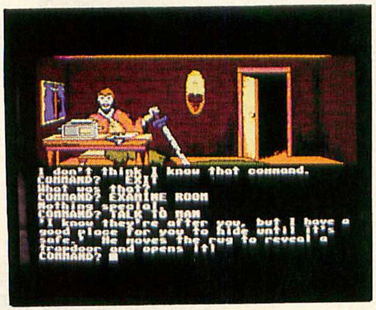


This is Max-10, an entry into the ever-growing world of Desktop Publishing.

Max-10 takes the Color Computer to new dimensions of graphics/document integration.

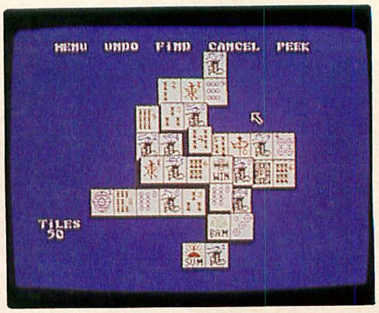
You can import text and graphics into your work using this publishing system.

9



```
I don't think I know that command.
COMMAND?  EXIT
What was that?
COMMAND? EXAMINE ROOM
Nothing special.
COMMAND? TALK TO MAN
"I know they're after you, but I have a
good place for you to hide until it's
safe."  He moves the rug to reveal a
trapdoor and opens it!
COMMAND? ■
```

10



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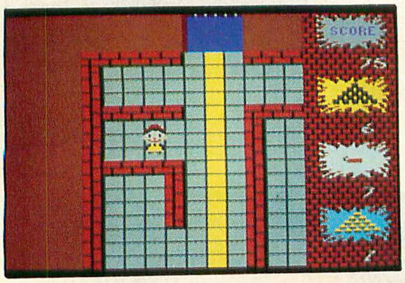
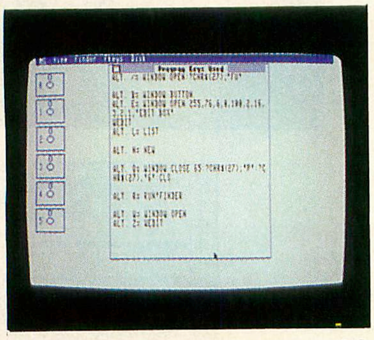


12



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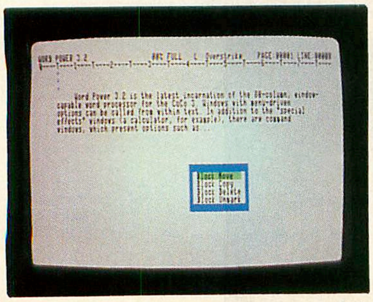


14

CoCo 3

[7] Trigger happy? Our Business Assistant, Dawn Cecil, is. Here she is taking potshots at the screen with the *Iron Forest* phaser. If you feel you're up to zapping a few monsters in the mission to protect a sacred white dove, this game is for you. (The graphics and sound effects are great!) From Diecom Products for disk systems only: $29.95 U.S., $37.95 CDN; with phaser and interface, $74.95 U.S., $93.95 CDN.

[8] *Thexder* is the Number 1 arcade hit from the Land of Sushi and the Rising Sun. If you're into Transformers, you should like this game. From Sierra On-Line, available in Radio Shack stores everywhere, $24.95.

[9] Integrate text and graphics and dabble in new dimensions of desktop publishing with *Max-10*. It's menu-driven and requires a disk drive and a Hi-Res joystick or mouse. From Colorware, $79.95 plus $3 S/H.

[10] Feel like questing? Then go seek ye the Phoenix Crossbow in Sundog Systems' *In Quest of the Star Lord* ($34.95 plus $2.50 S/H). Requires disk drive.

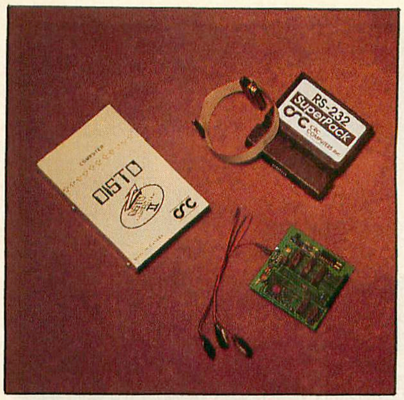
[11] Based on the ancient game of mah-jongg, *Shanghai* is a brain-teaser for those who don't give up easily. It's on a ROM pack from Activision for $34.95: Available in Radio Shack stores nationwide.

[12] Ever get the feeling you're lost in a maze and being chased by ugly monsters? Perhaps you've been playing *A Mazing World of Malcolm Mortar* in your sleep. On a ROM pack from Tandy for $29.95: Available in Radio Shack stores nationwide.

[13] Dive into a mouse- and menu-driven programming environment for Enhanced Color Disk BASIC with *Window Master*. It requires 512K and adds more than 50 commands and functions to CoCo 3's BASIC. From Cer-Comp, $69.95 plus $3 S/H.

[14] If you're in the market for 80-column, menu-driven CoCo 3 word processors, you might check out *Word Power* 3.2, which features a print spooler, spelling checker and split-screen editing. From Microcom Software, $79.95.

15



16

17

18

19

Hardware

[15] You might want to hold off on that new floppy drive you're planning to buy — Arizona Small Computer Peripherals is selling full-height hard drive kits that come with drive, SASI controller, power supply and cables. You supply the case and interface. Available in 5-Meg ($120), 8-Meg ($140) and 10-Meg ($160) models. As a bonus, some public domain software is included. The drive shown here is in a case and has a controller attached.

[16] Here's a trio of goodies for any serious computer buff. CRC/Disto's Super Controller II ($130) offers souped-up I/O and extra care for OS-9 operations. The EPROM programmer ($54.95) can attach to the Super Controller and "burn in" favorite utilities. The RS-232 SuperPack ($49.95 — requires Multi-Pak) offers CoCoists an RS-232 serial port.

[17] If it's a self-centering joystick you want, here it is, the ComMander Deluxe Joystick — with its four firebuttons for lefties and righties both. The joystick was designed for other computer systems but has been modified by CRC/Disto for the CoCo's joystick ports. From CRC/Disto, $29.95.

[18] You ought to be in pictures. And if you have a CoCo 3, a video camera, disk drive and a Multi-Pak — you can be. The DS-69B Digisector pack shown here with our Customer Service Manager, Beverly Bearden, is sold by The Micro Works and costs $149.95.

[19] Oh say, how cheaply can you see with this 12-inch, 80-column-capable green-screen monochrome monitor? Only $67.50 plus $7 S/H. Sold by Howard Medical Computers.

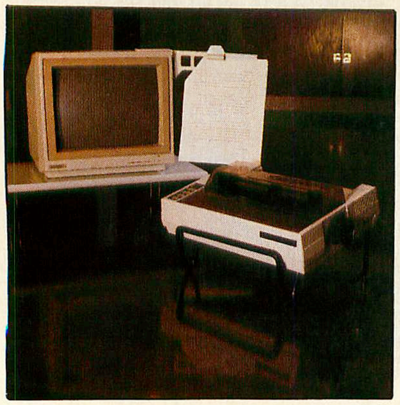
[20] If you have data that's too important to lose, spring for Solid Drive, a static RAM disk that write-protects itself on power loss. It includes OS-9 and Disk BASIC device drivers and requires a Multi-Pak. From Vidicom Corp., available in 512K ($395) or 1-Meg ($695) version.

[21] How about it, CoCo 1 and 2 users? Here's the ultimate upgrade — Tandy's 128K Color Computer 3 ($129.95) and a CM-8 RGB monitor ($299.95) to take advantage of its native 64 colors and 80 columns, and an FD 502 single disk drive ($199.95). See what memory and Hi-Res graphics can do.

SolidDrive
Instruction Manual

20

21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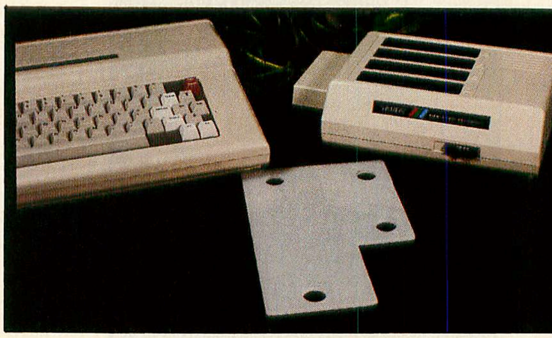
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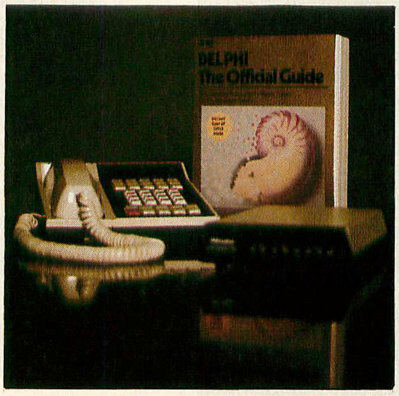


24

25

GENIUS
PRINT'n WEAR!
PRINT'n WEAR!
26

OS-9 LEVEL II
OS
RAINBOW
RAINBOW
Graphics View Masters
27

Accessories

[22] Here's an assortment of accessories to make the computing life a little easier. The DM-8 printer stand from Datum Manufacturing ($14.95) allows anxiety-free printer relations; tractor-feed paper can be stored snag-free underneath. The Curtis Copy Clip ($6.95), a reversible copy holder from Curtis/PCA, keeps your eyes monitor-level; it attaches to the monitor with velcro and folds back out of the way when not in use.

[23] Don't let one bump in the night cost you $$$$ — get an MPI-CoCo Locking Plate from Gimmesoft ($7.95) and keep your CoCo 3/Multi-Pak connections solid. Comes in two styles.

[24] The ultimate off-line utility — *DELPHI: The Official Guide* — will get you acquainted with every aspect of the Delphi online information service in its 488 pages. From Simon & Schuster, $21.95.

[25] The MS-500 monitor stand from Datum Manufacturing ($17.95) saves desktop space and adds a touch of class to your CoCo setup.

[26] Set your own style with Foto-Wear!'s iron-on transfer paper. Print a graphic using a color printer — or color a black-and-white printout with crayons — and iron it onto a cotton garment. This T-shirt shows the possibilities. Four-transfer pack, $9.95; 10-transfer pack, $19.95.

[27] A gift subscription to THE RAINBOW and RAINBOW ON TAPE or DISK is a gift that keeps giving the whole year round. RAINBOW's OS-9 books, the binders, the Adventure books and other entries in the RAINBOW Library make nice gifts, also. See pages 10, 12, 24, 50, 51 and 112 for more information on ordering these items.

Wall Street comes to your CoCo screen with this game of luck and skill in buying and selling stocks

Playing the Stock Market

By Mark Webb

Stock Ticker is a Simulation game of buying and selling stocks, collecting dividends and becoming wealthy. There are two versions of the program. Listing 1, `STOCKS3`, will work on any CoCo 3 with 128K, an RGB monitor and one joystick. Listing 2, `STOCKS2`, will run on the CoCos 1 and 2 and requires at least 16K ECB of memory.

`STOCKS3`, the CoCo 3 version, is menu-driven and uses the right joystick to execute commands. `STOCKS2`, the CoCo 1 and 2 version, uses the following keys for game play:

H	Help Screen
C	Original buy for playing against the CoCo (HAL)
A	Autoroll
S	Sell stocks
Q	Quit Autoroll
B	Buy stocks
Space bar	Roll (single)

Also, in the CoCo 1 and 2 version: Pressing the up-arrow key allows the next player to buy stocks without rolling and affecting the stock values. This allows each player to buy stocks at the same price and can only be used at the beginning of the game. If you are playing against the CoCo (called "HAL" and only available in the CoCo 1 and 2 version), press C when it is CoCo's turn to do the initial buying.

The available stocks are as follows:

GO = Gold
SI = Silver
OI = Oil
BO = Bonds
IN = Industrial
GR = Grain

CoCo 3 version only:
FO = Forestry
SP = Space

Both versions of *Stock Ticker* are designed for up to four players. The object of the game is to buy and sell stocks so that you accumulate more wealth by the end of the game than any other player. Each player begins the Simulation with $10,000 and may purchase stock at the start of the game at par value (e.g., $2,000 will buy 2,000 shares of any stock at the start of the game.) It is not necessary to spend all of your money at once, though after the first player rolls, the prices may change. However, you can buy and sell any time it is your turn. An Autobuy feature is included which can be used to buy stocks for you automatically when you have enough money. By using Autobuy, you can select any of the stocks you want it to buy for you. You can even select *all* the stocks, sit back and watch your money *roll in!* Stocks can be "turned on" or "off" as many times as you want when it is your turn. The Roll option will roll just once for you and then stop. Autoroll will keep rolling until the joystick button is pressed on the CoCo 3 version or Q is pressed on the CoCo 1 and 2.

The computer sounds a notice when a stock has declared a dividend and is at or above par value of 100. At this point players are paid a dividend amount depending upon how many shares of that stock they own. If a stock rises above 200, all players holding shares in it are granted a two-for-one split, and the stock is restored to a par of 100. If a stock crashes, or falls below zero, then players unfortunate enough to be holding that stock lose all their shares of it.

The game ends when the number of rounds winds down to zero. When that occurs, the computer calculates each player's gross worth at game's end and displays it on the screen. A 500-round game can be played in 45 minutes to an hour.

(Questions or comments concerning these programs may be addressed to the author at P.O. Box 793, Gold River, B.C., Canada V0P 1G0. Please enclose an SASE when requesting a reply.) ☐

* * *

Mark Webb is a computerist by both vocation and avocation. He runs the chemical-plant computer at a Canadian pulp mill and, after hours, programs his CoCo 1 and 3.

47	197	1580	159
205	186	2075	160
250	180	3030	94
314	98	4080	218
350	219	5015	9
376	126	6215	235
520	228	7150	228
680	24	7390	54
900	166	8510	74
1128	238	END	242
1380	203		

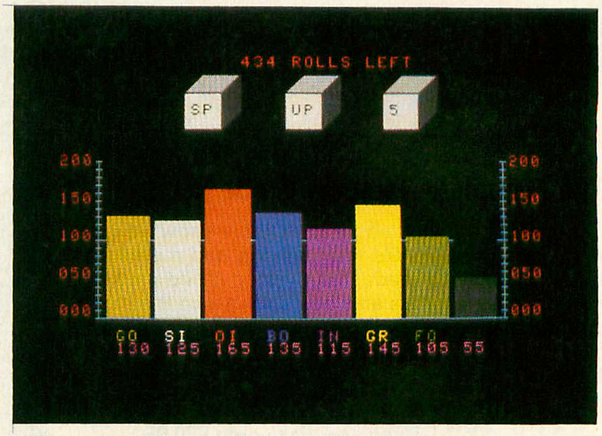
Listing 1: STOCKS3

```
0 'stockticker 88 (C)
1 'by mark webb
2 '
3 'COMPLETED MARCH 1988
4 '
5 'BOX 793
6 'GOLD RIVER B.C.
7 'CANADA
8 'V0P-1G0
9 '
10 POKE65497,0
15 CLEAR500
20 CLS0
30 DIM X,Y,J0,Y1,P,N$(4),SV(8),O
V(8),M(4),S$(8),SL$(8),S(4,8),P1
(15),P2(15),T$(9),A$,B$,C$,D$,E$
(3),U,AB(4,8),Z
35 U=1
40 FORX=1 TO 8:SV(X)=100:OV(X)=0
:NEXTX
41 T$(6)="BR1BU1F1R4NE1L2U8R2NF1
L4G1BD7BR6"
42 T$(7)="BR1NR4U4NR3U4R4BD8BR2"
43 T$(8)="U8R2F1D2G1L2R1F2D2BR2"
44 T$(9)="BR1R2E1U2H4U2E1R2F1D2G
4D2F1BR6"
45 T$(1)="BR1NH1R3E1U2H1L3H1U2E1
R3F1BD7"
46 T$(2)="BR3E1NF1U7L2NG1R4F1BD7
"
47 T$(3)="BR2NR3U1H1U4E1U1R3D1F1
D4G1D1"
48 T$(4)="BR4R2NE1L2H1U6E1R2F1BD
7BR2"
49 T$(5)="U8D4R1F2ND2H2E2U2BD8BR
1"
50 FORX=1 TO 4:M(X)=10000:NEXTX
52 E$(1)="UP":E$(2)="DN":E$(3)="
DV"
55 DATA 0,7,0,0,0,0,0,0,0,11,33,
20,47,55,52,0
56 FORX=0 TO 15:READP2(X):NEXTX
57 POKE&HE6C6,18:POKE&HE6C7,18
60 DATA 0,48,63,38,9,40,54,17,7,
24,46,5,1,2,56,59
70 FORX=0 TO 15:READP1(X):NEXTX
80 FORX=0 TO 15:PALETTEX,P1(X):N
EXTX
90 DATA GO,SI,OI,BO,IN,GR,FO,SP
100 FORX=1 TO 8:READ S$(X):NEXTX
101 DATA GOLD,SILVER,OIL,BONDS,I
NDUSTRIAL,GRAIN,FORESTRY,SPACE
102 FORX=1 TO8:READSL$(X):NEXTX
110 GOTO5000
200 '80 column screen setup
201 HSCREEN0:WIDTH80
202 CLS1
203 POKE&HE047,0
205 FORX=0 TO 15:PALETTEX,P2(X):
NEXTX
206 ATTR5,0:LOCATE23,0:PRINT"* *
 * * STOCKTICKER 88 * * * *";:AT
TR1,0
207 FORX=0 TO 3:LOCATE1+X*20,2:P
RINT N$(X+1);:NEXTX
208 FORX=0 TO 3
209 FORY=1 TO 8
210 LOCATE1+X*20,2+Y:PRINT S$(Y)
;" - 0";
211 NEXTY,X
212 FORX=0 TO 7
213 ATTR3,0:LOCATE2+X*10,12:PRIN
T S$(X+1);"=";SV(X+1);
214 NEXTX
215 ATTR2,0
216 FORY=0 TO 3
217 FORX=0 TO 3
218 LOCATE2+X*20,14+Y
219 PRINT S$(Y+1);"  ";S$(Y+5);
220 NEXTX,Y
221 ATTR4,0
222 LOCATE3,19:PRINT"BUY";
223 LOCATE18,19:PRINT"SELL";
224 LOCATE34,19:PRINT"ROLL";
225 LOCATE50,19:PRINT"AUTOROLL";
226 LOCATE68,19:PRINT"AUTOBUY";
227 ATTR1,0
228 RETURN
250 '80 column screen update
251 HSCREEN0:FORX=0 TO 15:PALETT
EX,P2(X):NEXTX
252 ATTR1,0,U:FORX=0 TO P-1:LOCA
TE1+X*20,2:PRINTN$(X+1);:NEXTX
254 ATTR3,0,B:LOCATE1+(U-1)*20,2
:PRINTN$(U);
256 ATTR4,0:FORX=1 TO P:LOCATE7+
(X-1)*20,2:PRINTUSING"$$#######"
;M(X);:NEXTX
258 FORX=0 TO 3
260 FORY=1 TO 8
262 LOCATE5+X*20,Y+2:PRINTS(X+1,
Y);
264 NEXTY,X
266 LOCATE32,21:PRINTNR;"ROLLS L
EFT";
268 FORX=0 TO 7
270 LOCATE5+X*10,12:PRINTSV(X+1)
;
```

```
272 NEXTX
298 RETURN
300 'joystick input here
310 J0=JOYSTK(0):J0=INT(J0/12)
311 FORX=1 TO 88:NEXTX:IFJ0=0 TH
EN J0=1
312 ATTR3,0:ONJ0 GOSUB320,322,32
4,326,328
313 FORX=0 TO 88:NEXTX
314 ATTR4,0:ONJ0 GOSUB320,322,32
4,326,328
316 IF BUTTON(0)=1 THEN SOUND RN
D(255),1:GOTO330 ELSE310
320 LOCATE3,19:PRINT"BUY";:RETUR
N
322 LOCATE18,19:PRINT"SELL";:RET
URN
324 LOCATE34,19:PRINT"ROLL";:RET
URN
326 LOCATE50,19:PRINT"AUTOROLL";
:RETURN
328 LOCATE68,19:PRINT"AUTOBUY";:
RETURN
330 ON J0 GOTO335,370,400,430,45
0
334 'buy main
335 GOSUB340:GOTO354
340 'buy & sell subroutine
341 ATTR3,0:A$=STRING$(40," ")
342 LOCATE32,21:PRINT"HOW MANY S
HARES?";:PLAY"T128V31L6401CECECO
4EFGO5GGFG"
343 J0=JOYSTK(0):NS=(J0+1)*500
344 LOCATE49,21:PRINT"      ";
345 LOCATE49,21:PRINTNS;:FORX=1T
O111:NEXTX
346 IF BUTTON(0)=1 THEN348
347 GOTO343
348 PLAY"O3CGCGCGEFDGEFDGEGGGGEF
FFFFEDDDO1GDFEGCCC":LOCATE32,22:
PRINT"OF WHICH STOCK?";
349 J0=JOYSTK(0):ST=INT((J0+4)/8
):IFST<1 THEN ST=1
350 LOCATE49,22:PRINT"
";
351 LOCATE49,22:PRINT SL$(ST);
352 IF BUTTON(0)=1 THEN RETURN
353 GOTO349
354 IF NS*SV(ST)/100>M(U) THEN35
5 ELSE360
355 LOCATE20,21:PRINTA$:LOCATE20
,22:PRINTA$;
356 LOCATE32,21:PRINT"NOT ENOUGH
 MONEY!";
357 SOUND180,2:FORX=1 TO 667:NEX
TX
358 LOCATE32,21:PRINT"
     ";
359 GOTO362
360 LOCATE20,21:PRINTA$;:LOCATE2
0,22:PRINTA$;:M(U)=M(U)-NS*SV(ST
)/100
361 S(U,ST)=S(U,ST)+NS
362 GOSUB250:GOTO300
363 '****************************
370 'sell main
372 GOSUB340
374 IF NS>S(U,ST) THEN376 ELSE38
6
376 LOCATE20,21:PRINTA$;:LOCATE2
0,22:PRINTA$;
378 LOCATE32,21:PRINT"NICE TRY E
H!";
380 FORX=1 TO22:PLAY"T255L128O3F
FGGFFGGF":NEXTX
382 LOCATE32,21:PRINT"
  ";
384 GOTO395
386 M(U)=M(U)+NS*SV(ST)/100
390 S(U,ST)=S(U,ST)-NS
392 LOCATE20,21:PRINTA$;:LOCATE2
0,22:PRINTA$;
395 GOSUB250:GOTO300
397 '****************************
400 'roll once
410 GOSUB8000:GOSUB3000
411 U=U+1:IFU>P THEN U=1
412 GOSUB250
420 GOTO300
425 '**************************
430 'autoroll
431 AR=88
432 GOSUB8000:GOSUB3000
433 U=U+1:IFU>P THEN U=1
434 IF BUTTON(0)<>1 THEN432
436 AR=0:FORX=0 TO 15:PALETTEX,0
:NEXTX:GOSUB250:GOTO300
440 '**************************
450 'autobuy main
455 GOSUB8500
460 GOTO 300
500 'how many players routine
520 HCOLOR10,10
530 HPRINT(11,5),"HOW MANY PLAYE
RS?"
540 FORX=0 TO 3
550 HCOLOR8,8:HLINE(56+X*56,84)-
(56+(X*56)+32,64),PSET,BF
560 HCOLOR14,14:HLINE(57+X*56,83
)-(55+(X*56)+32,65),PSET
570 HLINE(60+X*56,68)-(52+(X*56)
+32,80),PSET,BF
575 HLINE(57+X*56,65)-(55+(X*56)
+32,83),PSET
580 HCOLOR0,0:HLINE(60+X*56,68)-
(52+(X*56)+32,80),PSET,B
590 NEXTX
610 HDRAW"BM68,77;S4;C0;R6L3U6R3
L6"
620 HDRAW"BM124,77;R6L4U6L2R5NR2
D6R2"
630 HDRAW"BM179,77;NR8R2NU5R2NU5
```

```
R2U6R2L8"
640 HDRAW"BM235,77;NR12R2U6L2NR1
2R4D4F2R2E2U3"
650 J0=JOYSTK(0):J0=INT(J0/16)
660 HCOLOR4,0
670 HLINE(55+J0*56,85)-(89+J0*56
,63),PSET,B
680 IF BUTTON(0)=1 THEN BP=77 EL
SEBP=0
690 HLINE(55+J0*56,85)-(89+J0*56
,63),PRESET,B
700 IF BP=77 THEN 710 ELSE 650
710 PLAY"T255L128O1FFGFFGDFFD"
720 P=J0+1
730 RETURN
749 'BACKGROUND FOR # PLAYERS
750 HCOLOR8,0
755 HCLS0
760 FORX=0 TO 319 STEP6
770 HLINE(X,0)-(X,191),PSET
780 NEXTX
790 FORY=0 TO 191 STEP 4
800 HLINE(0,Y)-(319,Y),PSET
810 NEXTY
820 FORX=0 TO 8
830 HLINE(X,X)-(319-X,191-X),PSE
T,B
840 NEXTX
850 HDRAW"BM0,0;C0;F8;BM319,0;G8
;BM0,191;E8;BM319,191;H8;"
860 FORX=11 TO 309 STEP32
870 HSET(X,4,15):HSET(X,5,15):HS
ET(X+1,4,14):HSET(X+1,5,14)
872 HSET(X,187,14):HSET(X,188,14
):HSET(X+1,187,15):HSET(X+1,188,
15)
880 NEXTX
890 FORY=11 TO 180 STEP24
900 HSET(4,Y,15):HSET(4,Y+1,15):
HSET(5,Y,14):HSET(5,Y+1,14)
910 HSET(315,Y,15):HSET(315,Y+1,
15):HSET(316,Y,14):HSET(316,Y+1,
14)
920 NEXTY
990 RETURN
999 'graph update subroutine
1000 FORX=1 TO 8
1010 IF SV(X)=OV(X) THEN1120
1020 IF SV(X)>OV(X) THEN 1030 EL
SE1080
1030 FORY=OV(X) TO SV(X)
1040 HCOLORX:Y1=INT(Y/2)
1050 HLINE(2+X*32,168-Y1)-(30+X*
32,168-Y1),PSET
1060 NEXTY
1070 GOTO1120
1080 FORY=OV(X) TO SV(X) STEP-1
1090 HCOLOR0,0:Y1=INT(Y/2)
1100 HLINE(2+X*32,168-Y1)-(30+X*
32,168-Y1),PRESET
1110 NEXTY
```

```
1120 NEXTX
1125 FORY=1 TO 8:OV(Y)=SV(Y):NEX
TY
1126 HCOLOR3,0:HLINE(112,0)-(144
,8),PRESET,BF:HPRINT(14,0),NR-1
1127 HCOLOR9,0:HLINE(28,168)-(29
2,168),PSET
1128 HCOLOR10,0:HLINE(40,184)-(2
88,191),PRESET,BF
1129 FORX=1 TO 8:HPRINT(4*X,23),
SV(X):NEXTX
1130 NR=NR-1
1131 IF NR=0 THEN 6000
1132 IF AR=88 THEN1140
1135 FORX=0 TO15:PALETTEX,0:NEXT
X
1140 RETURN
1199 'graph set up subroutine
1200 HCLS
1210 HCOLOR9,0
1220 HLINE(28,68)-(28,168),PSET
1230 HLINE-(292,168),PSET
1240 HLINE-(292,68),PSET
1250 HLINE(28,118)-(292,118),PSE
T
1260 FORX=168 TO 68 STEP-5
1270 HLINE(26,X)-(30,X),PSET
1280 HLINE(290,X)-(294,X),PSET
1290 NEXTX
1300 FORX=1 TO 8
1310 HCOLORX,0
1320 HPRINT(1+4*X,22),S$(X)
1330 NEXTX
1340 HCOLOR8,0
1350 D$="NR24U24NE12R24E12NL24G1
2D24E12U24"
1360 HDRAW"BM84,48;XD$;BM148,48;
XD$;BM212,48;XD$;"
1370 FORX=0 TO 2
1380 HPAINT(86+X*64,46),2,8
1390 HPAINT(110+X*64,44),8,8
1400 HPAINT(88+X*64,22),14,8
1410 NEXTX
1415 HCOLOR3,0:HPRINT(18,0)," RO
LLS LEFT"
1416 HCOLOR3,0:HPRINT(0,8),"200"
:HPRINT(0,11),"150":HPRINT(0,14)
,"100":HPRINT(0,17),"050":HPRINT
(0,20),"000"
1417 HPRINT(37,8),"200":HPRINT(3
7,11),"150":HPRINT(37,14),"100":
HPRINT(37,17),"050":HPRINT(37,20
),"000"
1420 RETURN
1500 'number of rounds routine
1510 HCLS8
1520 FORX=0 TO 158 STEP 8
1530 Y=X:IFY>191 THEN Y=191
1540 HCOLOR4,0
1550 HLINE(X,Y)-(319-X,191-Y),PR
ESET,B
```



```
1555 HLINE(X+4,Y+4)-(315-X,187-X
),PSET,B
1560 NEXTX
1570 HCOLOR6:HPRINT(12,9),"NUMBE
R OF ROUNDS?"
1575 HCOLOR10,0
1580 J0=JOYSTK(0):J0=J0*25
1585 IF J0>999 THEN J0=999
1590 HLINE(150,96)-(174,102),PRE
SET,BF
1600 HPRINT(18,12),J0
1605 IF BUTTON(0)=1 THEN NR=J0:G
OTO1620
1610 GOTO 1580
1620 NR=NR+1
1630 RETURN
2000 'title page routine
2020 HCLS0
2030 FORX=1TO333:HSET(RND(319),R
ND(191),8):HSET(RND(319),RND(191
),14):HSET(RND(319),RND(191),4):
NEXTX
2050 A$=T$(1)+T$(2)+T$(3)+T$(4)+
T$(5)
2060 B$=T$(2)+T$(6)+T$(4)+T$(5)+
T$(7)+T$(8)
2062 HCOLOR8:HLINE(0,0)-(319,191
),PSET,B
2063 FORX=1 TO 12
2065 C$="BM"+STR$(20+X)+","+STR$
(78-X)+";"
2066 IF X=4 THEN HCOLOR4:HLINE(2
,2)-(317,189),PSET,B
2067 IF X=8 THEN HCOLOR14:HLINE(
4,4)-(315,187),PSET,B
2068 IF X=11 THEN HCOLOR3:HLINE(
6,6)-(313,185),PSET,B
2070 HDRAW"XC$;S16;XA$;XB$;"
2075 C$="BM"+STR$(130+X)+","+STR
$(164-X)+";"
2080 HDRAW"XC$;S24;XT$(9);XT$(9)
;"
2085 NEXTX
2086 HCOLOR10:HPRINT(15,22),"BY
MARK WEBB"
2095 PALETTE10,RND(16)+31:FORX=1
TO20:NEXTX
2096 IF BUTTON(0)=1 THEN2099
2097 IF INKEY$<>""THEN2099
2098 GOTO2095
2099 PALETTE10,44
2100 RETURN
3000 'roll dice,show em div
3001 'and update graph.
3003 FORX=0 TO 15:PALETTEX,P1(X)
:NEXTX
3005 HSCREEN2
3007 X=RND(-TIMER)
3010 D(1)=RND(8):D(2)=RND(3):D(3
)=RND(5)
3015 IF RND(5)=5 THEN IF D(2)=2
THEN D(2)=INT(3/RND(3))
3020 D(3)=D(3)*5
3025 HCOLOR2:FORX=0 TO 2:HLINE(8
8+X*64,31)-(104+X*64,41),PSET,BF
:NEXTX
3030 HCOLOR0:HPRINT(11,4),S$(D(1
)):HPRINT(19,4),E$(D(2)):HPRINT(
26,4),D(3)
3040 IF D(2)=1 THEN SV(D(1))=SV(
D(1))+D(3)
3050 IF SV(D(1))>=200 THEN SV(D(
1))=200:GOSUB1000:GOSUB4000:GOTO
3140
3060 IF D(2)=2 THEN SV(D(1))=SV(
D(1))-D(3)
3070 IF SV(D(1))<=0 THEN SV(D(1)
)=0:GOSUB1000:GOSUB4500:GOTO3140
3075 GOSUB1000
3080 IF D(2)=3 THEN3090 ELSE3140
3090 IF SV(D(1))<100 THEN 3140
3100 FORX=1 TO P
3110 Y=S(X,D(1))/100*D(3)
3120 M(X)=M(X)+Y
3130 NEXTX
3135 FORX=1 TO 5:PLAY"T255L255O4
CDEFGABO5CEGB":NEXTX
3140 RETURN
4000 'split routine
4010 SV(D(1))=100
4020 A$="*** "+SL$(D(1))+" HAS S
PLIT! ***"
4030 X=INT((40-LEN(A$))/2)
4040 HCOLORD(1):HPRINT(X,7),A$
4050 FORX=1 TO 100:PALETTED(1),R
ND(63):NEXTX
4060 PALETTED(1),P1(D(1))
4070 FORX=1 TO P:S(X,D(1))=S(X,D
(1))*2:NEXTX
4080 GOSUB1000
4090 HLINE(30,55)-(279,64),PRESE
T,BF
4100 RETURN
4500 'break routine
4510 SV(D(1))=100
4520 A$="### "+SL$(D(1))+" HAS B
USTED ###"
4530 X=INT((40-LEN(A$))/2)
```

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```
4540 HCOLORD(1):HPRINT(X,7),A$
4550 FORX=1 TO P:S(X,D(1))=0:NEX
TX
4560 FORX=1 TO 1000:NEXTX
4570 HLINE(30,55)-(279,64),PRESE
T,BF
4580 A$="ALL "+SL$(D(1))+" HAS B
EEN CONFISCATED"
4590 X=INT((40-LEN(A$))/2)
4600 HPRINT(X,7),A$
4610 SOUND30,2:GOSUB1000
4620 FORX=24 TO 159
4630 HLINE(X,55)-(X,64),PRESET:H
LINE(319-X,55)-(319-X,64),PRESET
4640 NEXTX
4650 RETURN
5000 'main startup section
5010 'game start gosubs
5015 HSCREEN2
5020 GOSUB2000
5030 GOSUB750:GOSUB500
5040 GOSUB1500
5050 GOSUB7000
5060 GOSUB1200:GOSUB1000
5070 GOSUB200
5080 GOSUB250
5090 GOTO 300
5100 END
6000 'end routine
6010 HSCREEN0
6020 WIDTH32
6030 RGB
6040 CLS0
6050 FORX=1 TO 30
6060 PRINT@X,CHR$(128+RND(126));
6061 PRINT@X+480,CHR$(128+RND(12
6));
6062 NEXTX
6065 FORY=1 TO 14:PRINT@Y*32,CHR
$(128+RND(126));:PRINT@Y*32+31,C
HR$(128+RND(126));:NEXTY
6070 POKE&HFFBC,45:POKE&HFFBD,0
6080 PRINT@33," * * * * STOCKTIC
KER 88 * * *";
6090 PRINT@106,"FINAL TOTALS";
6092 PRINT@138,"============"
6100 FORX=1 TO P
6110 FORY=1 TO 8
6120 M(X)=M(X)+SV(Y)*S(X,Y)/100
6130 NEXTY,X
6200 FORX=1 TO P
6210 PRINT@135+X*64,N$(X);
6215 PRINT@145+X*64,M(X);
6220 NEXTX
6230 PRINT@427,"GAME OVER";
6240 POKE&HFFBC,50:POKE&HFFBD,0
6500 I$=INKEY$:IFI$=""THEN6500
6510 GOTO 9999
7000 'name input routine
7010 FORX=200 TO 10 STEP-10
7020 SOUNDX,1
7030 NEXTX
7035 HCLS12
7050 HCOLOR0:HLINE(0,100)-(319,1
06),PSET
7060 Y=80
7070 FORX=0 TO 319
7080 Z=RND(3)-2:Y=Y+Z
7090 IF Y>98 THEN Y=98
7100 IF Y<50 THEN Y=50
7110 HSET(X,Y,0)
7120 NEXTX
7130 HPAINT(2,40),11,0
7140 HPAINT(0,191),13,0
7160 HCOLOR14,0
7170 HLINE(87,56)-(216,120),PSET
,BF
7175 HCOLOR15
7180 HLINE(91,60)-(212,116),PSET
,BF
7190 HCOLOR14
7200 HLINE(87,56)-(71,40),PSET
7210 HLINE-(200,40),PSET:HLINE-(
216,56),PSET
7220 HLINE(71,40)-(71,104),PSET:
HLINE-(87,120),PSET
7230 HPAINT(73,100),8,14:HPAINT(
87,48),14,14
7240 HLINE(112,120)-(128,184),PS
ET,BF
7250 HLINE(176,120)-(192,184),PS
ET,BF
7260 HLINE(176,184)-(160,168),PS
ET
7270 HLINE-(160,120),PSET
7280 HLINE(112,184)-(96,168),PSE
T
7290 HLINE-(96,120),PSET
7300 HPAINT(104,160),8,14
7310 HPAINT(168,168),8,14
7315 HCOLOR8:HLINE(87,120)-(216,
120),PSET
7316 HLINE(87,56)-(216,56),PSET
7320 HCOLOR0,0
7330 HPRINT(12,8),"PLAYERS NAMES
?"
7340 FORX =1 TO P
7350 Y=0
7360 HPRINT(12,9+X),"#"+RIGHT$(S
TR$(X),1)
7370 I$=INKEY$:IFI$=""THEN7370
7380 IFI$=CHR$(13) THEN7430
7390 IF I$=CHR$(8) THEN HCOLOR15
:SOUND50,1:HLINE(104,72+X*8)-(20
0,80+X*8),PSET,BF:N$(X)="":HCOLO
R0:GOTO7350
7400 N$(X)=N$(X)+I$:IFLEN(N$(X))
=8 THEN7430
7410 HPRINT(16+Y,9+X),I$:Y=Y+1
7420 GOTO7370
7430 NEXTX
7440 RETURN
```

```
8000 'autobuy subroutine
8005 FL=0
8010 FORX=1 TO 8
8020 IF AB(U,X)=99 THEN FL=11:C=
0
8030 NEXTX
8040 IF FL<>11 THEN 8090
8050 X=RND(8):C=C+1
8055 IF C>=30 THEN 8090
8056 IF AB(U,X)<>99 THEN8050
8060 IF M(U)>=SV(X)*5 THEN S(U,X
)=S(U,X)+500:M(U)=M(U)-SV(X)*5
8070 IF M(U)>=1000 THEN8050
8090 FL=0:RETURN
8500 'autobuy on/off routine
8510 J0=JOYSTK(0):J0=INT((J0+1)/
8)
8515 IF J0=0 THEN J0=1
8520 Y=13
8530 X=2+((U-1)*20)
8540 IF J0>4 THEN X=X+4
8550 IF J0>4 THEN Y=Y+J0-4 ELSE
Y=Y+J0
8560 LOCATEX,Y
```

```
8570 ATTR6,0:PRINTS$(J0);
8580 FORZ=1 TO 222:NEXTZ
8585 LOCATEX,Y
8590 ATTR2,0:PRINTS$(J0);
8600 FORZ=1 TO 222:NEXTZ
8610 IF BUTTON(0)=1 THEN IF AB(U
,J0)=99 THEN AB(U,J0)=0:GOTO8630
 ELSE AB(U,J0)=99:GOTO8630
8620 GOTO8510
8630 PLAY"T255O3DDGGDDO1CCCO3DEF
D"
8632 FORZ=1 TO 8
8633 Y=13:X=2+((U-1)*20)
8634 IF Z>4 THEN X=X+4
8635 IF Z>4 THEN Y=Y+Z-4 ELSE Y=
Y+Z
8640 IF AB(U,Z)=99 THEN ATTR6,0:
LOCATEX,Y:PRINTS$(Z); ELSE ATTR2
,0:LOCATEX,Y:PRINTS$(Z);
8645 NEXTZ
8650 RETURN
9999 HSCREEN0:WIDTH32:RGB:POKE&H
FFBC,45:POKE&HFFBD,0:POKE65496,0
:END
```

		1620	123
200	211	1840	123
330	118	2010	176
530	16	2180	5
760	47	2355	188
950	61	2620	166
1160	89	2840	12
1400	16	END	160

Listing 2: STOCKS2

```
10 CLS0
20 CLEAR2500
30 DIM BA$(14),G(6,4),G$(8),T(14
),L(6),L$(6),Z(6)
40 '
50 '***STOCK TICKER*86**********
60 '***BY MARK WEBB ************
70 '***FOR COCO 1&2*************
80 '***REVISED AUG. 88**********
90 '***BOX 793 GOLD RIVER B.C.**
100 '**CANADA***VOP 1G0*********
110 '
120 POKE142,0
130 X=RND(-TIMER)
140 PL$(1)="V31O5T100L1GABBGABBG
ABBGABBGABBGABBGABBGABBGABBGABB"
150 PL$(2)="V31T64O1L4CCFFCCFFCC
FFCCFFBCCFFCCFFCCFFCCFFCCFFCCFFC
CFFCCFFCCFF"
```

```
160 PL$(3)="V31T32O4BAGFEDCO3BAG
FEDCO2BAGFEDCO1BAGFEDC"
170 PL$(4)="V31T32O2CDEFGABO3CDE
FGABO4CDEFGABO5CDEFGAB"
180 PL$(5)="V31L16T255O4CEGBDFAC
EGBDFACEGBDFACEGBDFA"
190 PL$(6)="V31T28O4L4V15CV13CV1
1CV9CV7CV5CV3CV1CV3CV5CV7CV9CV11
CV13CV15C"
200 G$(1)=STRING$(31,249):G$(2)=
STRING$(31,246)
210 G$(3)=STRING$(32,143):G$(4)=
STRING$(31,143)
220 U=1:AD=0
230 FORX=1TO6:READ D1$:S$(X)=D1$
:NEXTX
240 DATA GOLD,SILVER,OIL,BONDS,I
NDUST,GRAIN
250 FORX=1TO6:L(X)=100:NEXTX
260 FORX=1TO4
270 FORX1=1TO32
280 READD1:G$(4+X)=G$(4+X)+CHR$(
D1)
290 NEXTX1,X
300 DATA 128,128,167,175,175,175
,175,170,128,128,128,128,128,167
,175,175,175,175,170,128,128,128
,128,128,167,175,175,175,175,170
,128,128
310 DATA 128,167,175,175,175,175
,175,170,128,128,128,128,167,175
,175,175,175,175,170,128,128,128
```

```
,128,167,175,175,175,175,175,170
,128,128
320 DATA 128,143,143,143,143,143
,175,170,128,128,128,128,143,143
,143,143,143,175,170,128,128,128
,128,143,143,143,143,143,175,170
,128,128
330 DATA 128,143,143,143,143,143
,174,128,128,128,128,128,143,143
,143,143,143,174,128,128,128,128
,128,143,143,143,143,143,174,128
,128,128
340 'title page layout
350 CLS3
360 SOUNDRND(255),1
370 FORX=1TO14:PRINT@32*X,CHR$(2
49);:PRINT@32*X+31,CHR$(249);:NE
XTX
380 PRINT@0,STRING$(32,249);:PRI
NT@480,STRING$(31,249);
390 POKE1055,249
400 POKE 1535,249
410 PRINT@70,"***STOCK TICKER*86
**";
420 PRINT@138,"BY M.WEBB";
430 PRINT@297-32,"JAN/06,1984";
440 PRINT@265-32," COPYRIGHT ";
450 PRINT@326,"COCO 1-2 VERSION"
;
460 PRINT@387,"UPDATED MARCH 86
& AUG 88";
470 IF INKEY$=""THEN470ELSE480
480 '# of players set up
490 CLS3:PLAY"V31"
500 SOUNDRND(88),3
510 PRINT@70,"HOW MANY PLAYERS(1
-4)";:INPUTP
520 IF P=4 THEN 560
530 PRINT@162,"DO YOU WISH HAL T
O PLAY ALSO";
540 I$=INKEY$:IFI$="" THEN 540
550 IF I$="Y" OR I$="N" THEN 560
 ELSE540
560 PRINT@162,STRING$(30,175);
570 IF I$="N" THEN JJ=70:HF=88
580 FORX=1TO5:SOUNDRND(255),1:NE
XTX
590 IFP>4 THEN 480
600 FORX=1TOP
610 PRINT@134+(X-1)*64,"PLAYER #
";X;"NAME";:INPUTN$(X)
620 NEXTX
630 IF P=4 THEN 650
640 IF I$="Y" THEN P=P+1:N$(P)="
HAL"
650 FORX=1TOP:M(X)=10000:NEXTX
660 PLAYPL$(5)
670 CLS7
```

```
680 FORX=5 TO 26
690 PRINT@32+X,CHR$(159);
700 PRINT@448+X,CHR$(159);
710 NEXTX
720 FORX=3 TO 12
730 PRINT@32*X+3,CHR$(159);:PRIN
T@X*32+28,CHR$(159);
740 NEXTX
750 PRINT@103,"HOW MANY ROUNDS";
760 PRINT@199,"(200-400) IS AVG.
";
770 PRINT@301,"?    ";
780 R$="":R=0
790 I$=INKEY$:IFI$=""THEN790
800 IFI$=CHR$(8) THEN PRINT@302,
STRING$(4,143);:GOTO780
810 IFI$=CHR$(13) THEN830
820 R$=R$+I$:PRINT@302,R$;:GOTO7
90
830 PRINT@395,"OK? (Y/N)";:SOUND
22,1
840 I$=INKEY$:IFI$=""THEN840
850 IFI$<>"Y" THEN I$=CHR$(8):GO
TO800
860 R=VAL(R$):IFR<=0 THEN 670
870 PLAY PL$(6)
880 '
890 CLS
900 TP$=STRING$(6,128)+"stock"+C
HR$(128)+"ticker"+STRING$(14,128
)
910 PRINT TP$
920 POKE1043,56:POKE1044,54
930 PRINT@33,N$(1);:PRINT@49,N$(
2);:PRINT@257,N$(3);:PRINT@273,N
$(4);
940 PRINT@39,"$";:PRINT@55,"$";:
PRINT@263,"$";:PRINT@279,"$";
950 IF M(1)<1 THEN M(1)=0
960 IF M(2)<1 THEN M(2)=0
970 IF M(3)<1 THEN M(3)=0
980 IF M(4)<1 THEN M(4)=0
990 FORX=1 TO P
1000 M(X)=INT(100*M(X))/100
1010 NEXTX
1020 PRINT@40,M(1);:PRINT@56,M(2
);:PRINT@264,M(3);:PRINT@280,M(4
);
1030 FORX=1TO6
1040 PRINT@32*X+33,LEFT$(S$(X),2
);:PRINT@32*X+49,LEFT$(S$(X),2);
1050 NEXTX
1060 FORX=8TO13
1070 PRINT@32*X+33,LEFT$(S$(X-7)
,2);:PRINT@32*X+49,LEFT$(S$(X-7)
,2);
1080 NEXT X
1090 FORX=32TO192STEP32
```

```
1100 PRINT@4+X+32,G(X/32,1);:PRI
NT@20+X+32,G(X/32,2);:PRINT@228+
X+32,G(X/32,3);:PRINT@244+X+32,G
(X/32,4);
1110 NEXT X
1120 FORX=0 TO 5
1130 PRINT@480+X*5,L(X+1);
1140 NEXT X
1150 'draw a square beside playe
r
1160 IFU=1THENPRINT@32,CHR$(159)
;
1170 IFU=2THENPRINT@48,CHR$(159)
;
1180 IFU=3THENPRINT@256,CHR$(159
);
1190 IFU=4THENPRINT@272,CHR$(159
);
1200 'main loop
1210 BS$=INKEY$
1220 IF BS$="Q" THEN FL=0
1230 IF BS$="A" THEN FL=1
1240 IF FL=1 THEN 1350
1250 IF BS$="H" THEN GOTO2640
1260 IF BS$="^" THEN U=U+1:IF U>
P THEN U=1
1270 IFBS$="^"THEN 880
1280 IFBS$="B"THEN1910
1290 IF JJ=70 THEN 1310
1300 IF U=P THEN IF BS$="C" THEN
 JJ=70:GOTO2860
1310 IFBS$="S"THEN1910
1320 IFBS$=CHR$(32)THEN1350
1330 BS$=""
1340 GOTO1210
1350 'dice roll and adjustments
1360 IF HF=88 THEN 1380
1370 IF RND(3)=2 THEN IF U=P THE
N GOSUB2790
1380 RC=RC+1:IFRC>=R THEN 2400
1390 U=U+1:IF U>P THEN U=1
1400 'roll three dice
1410 PLAYPL$(2)
1420 D(1)=RND(6):D(2)=RND(3):D(3
)=RND(3)
1430 IF D(2)=2 THEN IF RND(10)>7
 THEN D(2)=RND(2)*2+-1
1440 IFD(3)=1THEN D(3)=5
1450 IFD(3)=2THEN D(3)=10
1460 IFD(3)=3THEN D(3)=20
1470 'ADJUST UP & DOWN
1480 GOSUB1620
1490 IF D(2)=1 THEN L(D(1))=L(D(
1))+D(3):PLAYPL$(4)
1500 IF L(D(1))>=200 THEN GOSUB1
730
1510 IF D(2)=2 THEN L(D(1))=L(D(
1))-D(3):PLAYPL$(3)
1520 IF L(D(1))<=0 THEN GOSUB182
0
1530 'dividend routine
1540 IF D(2)=3 THEN 1550 ELSE 16
10
1550 IFL(D(1))<100THEN FORX=1TO5
00:NEXTX:GOTO 1610
1560 PLAY PL$(1)
1570 FORX=1TOP
1580 DV=G(D(1),X)/100*D(3)
1590 M(X)=M(X)+DV
1600 NEXT X
1610 GOTO 880
1620 CLS0
1630 PRINT@71,"# ROLLS LEFT "+ST
R$(R-RC);
1640 PRINT@160,G$(5);:PRINT@192,
G$(6);
1650 PRINT@224,G$(7);:PRINT@256,
G$(7);
1660 PRINT@288,G$(8);
1670 PRINT@257,LEFT$(S$(D(1)),5)
;
1680 IF D(2)=1 THENPRINT@269,"UP
";
1690 IF D(2)=2 THENPRINT@268,"DO
```

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```
WN";
1700 IF D(2)=3 THENPRINT@269,"DI
V";
1710 PRINT@279,D(3);
1720 RETURN
1730 'splitting routine
1740 PRINT@396,"IT SPLIT!!";
1750 FORX=1TO3:PLAYPL$(1):NEXTX
1760 PRINT@396,"IT SPLIT!!";
1770 L(D(1))=100
1780 FORX=1TOP
1790 G(D(1),X)=G(D(1),X)*2
1800 NEXTX
1810 RETURN
1820 'breaking routine
1830 L(D(1))=100
1840 PRINT@396,"IT BROKE . . .";
1850 PRINT@384+32,"IT FELL THROU
GH THE FLOOR EH!";
1860 FOR X=1TOP
1870 G(D(1),X)=0
1880 NEXTX
1890 FORX=1TO 8:SOUND122,1:SOUND
20,1:NEXTX
1900 RETURN
1910 'buy & sell routine
1920 'display stocks first
1930 SOUND200,1
1940 CLS0
1950 PRINT@8,STRING$(17,236);:PR
INT@232,STRING$(17,227);
1960 FORX=0TO7:PRINT@X*32+7,CHR$
(229);:PRINT@X*32+25,CHR$(234);:
NEXTX
1970 PRINT@266,CHR$(239);:PRINT@
277,CHR$(239);:PRINT@297,CHR$(22
7);:PRINT@298,CHR$(236);:PRINT@2
99,CHR$(227);:PRINT@308,CHR$(227
);:PRINT@309,CHR$(236);:PRINT@31
0,CHR$(227);
1980 PRINT@320,STRING$(32,239);
1990 FOR X= 352TO448 STEP32:PRIN
T@X,G$(3);:NEXTX:PRINT@480,G$(4)
;:POKE1535,143
2000 PRINT@40,"GOLD   IS AT";L(1
);
2010 PRINT@72,"SILVER IS AT";L(2
);
2020 PRINT@104,"OIL    IS AT";L(
3);
2030 PRINT@136,"BONDS ARE AT";L(
4);
2040 PRINT@168,"INDUST IS AT";L(
5);
2050 PRINT@200,"GRAIN  IS AT";L(
6);
2060 PRINT@301,LEFT$(N$(U),6);
2070 PRINT@354,USING"$$#########
";M(U);
2080 IFBS$="B"THENPRINT@333,"BUY
ING";
```

```
2090 IFBS$="S"THENPRINT@333,"SEL
LING";
2100 PRINT@484,"PRESS *ENTER* TO
 RETURN";
2110 PRINT@390,"HOW MANY SHARES"
;:INPUTS:SOUNDRND(233),2
2120 IFS=0THEN880
2130 IFS<500 THEN 2110
2140 PRINT@423,"OF WHICH STOCK "
;:INPUTU$:SOUND233,2
2150 FORX=1TO6:IFLEFT$(U$,2)=LEF
T$(S$(X),2)THEN2160ELSE NEXTX:I$
="N":GOTO2200
2160 V=S/100*L(X)
2170 PRINT@454,"VALUE IS";V;"OK(
Y/N)";:PLAY"T255O5CGDGECCGDGECC"
2180 PRINT@485,"PRESS **Q** TO R
ETURN    ";
2190 I$=INKEY$:IF I$=""THEN2190
2200 IF I$="N"  THEN PRINT@462,S
TRING$(8,143);:PRINT@405,STRING$
(8,143);:PRINT@438,STRING$(8,143
);:GOTO2110
2210 IF I$="Q"THEN880
2220 IF BS$="B" THEN GOSUB2250:G
OTO 2240
2230 IF BS$="S" THEN GOSUB2340
2240 GOTO880
2250 'value calculator to buy
2260 IF V<=M(U) THEN 2310
2270 PRINT@390,"SORRY BUT YOU DO
NT     ";
2280 PRINT@423,"HAVE ENOUGH MONE
Y     ";
2290 PRINT@454,STRING$(21,143);
2300 SOUND30,20:RETURN
2310 G(X,U)=G(X,U)+S
2320 M(U)=M(U)-V
2330 RETURN
2340 'value calculator to sell
2350 IFG(X,U)>=S THEN2360 ELSE P
RINT@390,STRING$(24,143);:PRINT@
423,STRING$(24,143);:PRINT@454,S
TRING$(24,143);:PRINT@423,"NICE
TRY BUDDY";
2355 FORXW=1 TO 333:NEXTXW:GOTO8
80
2360 G(X,U)=G(X,U)-S
2370 M(U)=M(U)+V
2380 RETURN
2390 'end routine here eh
2400 CLS6:PRINT@167,"TIMES UP FO
LKS!!";
2410 PRINT@227,"ALL STOCKS WILL
NOW BE SOLD!";
2420 SOUND220,20
2430 SOUND200,20
2440 SOUND220,20
2450 SOUND200,20
2460 FORX=1TOP
2470 FORY=1TO6
```

```
2480 V=G(Y,X)/100*L(Y)
2490 M(X)=M(X)+V
2500 NEXTY
2510 NEXTX
2520 FORX=1TO6:PLAYPL$(X):NEXTX
2530 CLS8
2540 FORX=3TO P*3 STEP 3
2550 PRINT@X*32,N$(X/3);:PRINT@X
*32+7,USING"$$##########";M(X/3);
2560 NEXTX
2570 PN=1:HS=M(1)
2580 FORX=2 TO P
2590 IF M(X)>HS THEN HS=M(X):PN=
X
2600 NEXTX
2610 FORX=1 TO 1333:NEXTX
2620 PRINT@490,N$(PN)+" WINS EH!
";
2630 GOTO2630
2640 'help menu here
2650 CLS
2660 PRINT@10,"STOCK TICKER";
2670 PRINT@42,"------------";
2680 PRINT@102,"H = HELP";
2690 PRINT@134,"C = ORIGINAL BUY
 FOR HAL"
2700 PRINT@166,"A = AUTO ROLL";
2710 PRINT@230,"Q = QUIT AUTO RO
LL";
2720 PRINT@262,"B = BUY STOCKS";
2730 PRINT@198,"S = SELL STOCKS"
;
2740 PRINT@483," PRESS ANY KEY T
O RETURN";
2750 EXEC44539
2760 GOTO 880
2780 'hal routine
2790 IF M(U)<1000 THEN 2855
2800 CLSRND(8):PRINT@166,"I'M GO
NNA BUY";
2810 Y=0
2820 X=RND(6)
2830 Y=Y+1:IFY=12 THEN2855
2840 IF M(U)>=500/100*L(X) THEN
G(X,U)=G(X,U)+500:M(U)=M(U)-500/
100*L(X)
2850 GOTO 2820
2855 RETURN
2860 'auto buy for hals
2870 ' original buying
2880 FOR X=1 TO 10
2890 RS=RND(6)
2900 G(RS,U)=G(RS,U)+1000
2910 M(U)=M(U)-1000
2920 NEXTX
2930 U=1
2940 GOTO 880
```

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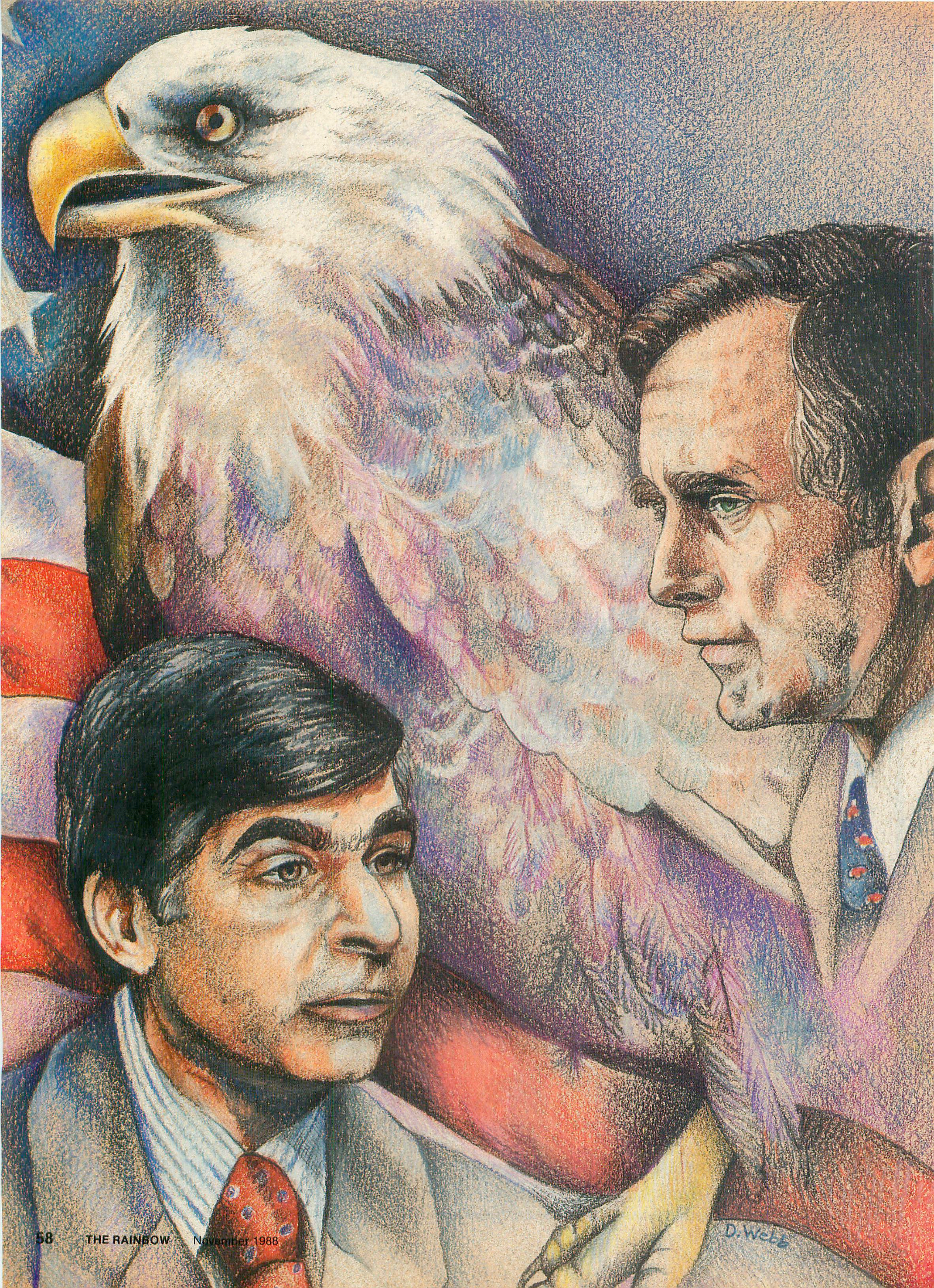
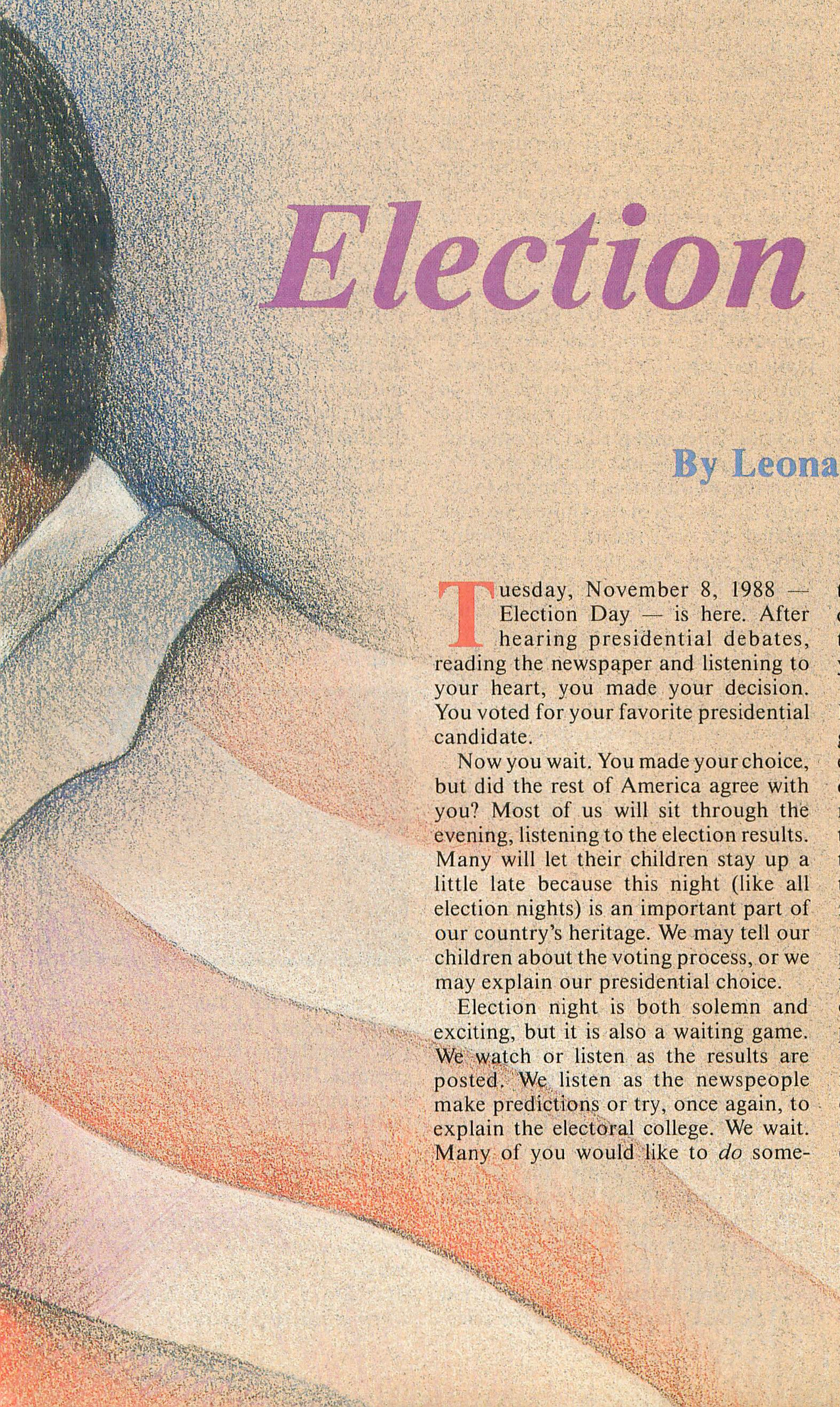

D. Webb

Use this program to keep track of election results and make your own predictions

Election '88

By Leonard Hyre



Tuesday, November 8, 1988 — Election Day — is here. After hearing presidential debates, reading the newspaper and listening to your heart, you made your decision. You voted for your favorite presidential candidate.

Now you wait. You made your choice, but did the rest of America agree with you? Most of us will sit through the evening, listening to the election results. Many will let their children stay up a little late because this night (like all election nights) is an important part of our country's heritage. We may tell our children about the voting process, or we may explain our presidential choice.

Election night is both solemn and exciting, but it is also a waiting game. We watch or listen as the results are posted. We listen as the newspeople make predictions or try, once again, to explain the electoral college. We wait. Many of you would like to *do* something on election night, and your children may have difficulty following the television-posted results. But what can you do?

THE RAINBOW is proud to present Leonard Hyre's *Election '88*. This program lets you plot the progress of the election results *as they come in*. You don't have to wait for your favorite newscasters to give the results, explain their significance and make their predictions. With this program, you can enter the information, see the results and make your own predictions.

The presidential election is a vital part of our political system. Whether or not our candidate wins, we know that our votes count in the decision-making process. THE RAINBOW and Leonard Hyre are happy to give you and your family a program that will make this election's coverage a little more fun and interesting. Enjoy election night, and enjoy *Election '88*!

Soon we will elect a man to lead our nation for the next four years — the president of the United States. Like most Americans, my political sense is heightened during the time preceding our presidential election. I am, as we all are, involved in an important decision.

In July, I presented *Convention* as an aid in understanding and enjoying each party's nomination process. *Election '88* is a companion to the previous program. *Election '88* will help you and your family enjoy and understand the election process by letting you tabulate election results, review election history and predict the election's outcome.

> ***"Gather the family around on or before Election Eve and let them guess which candidate will carry each state."***

Let's begin with a brief explanation of our electoral system. Our president and vice president are not elected by popular vote. Instead, they are elected by electoral vote. When we vote for a president, we are actually voting for a particular party's right to send its *electors* to the electoral college. Each state and the District of Columbia sends as many electors as it has senators and representatives. There are 538 electoral votes available. To win the presidency or the vice presidency, a candidate needs at least 270 votes. If neither candidate receives enough electoral votes, the Senate and the House of Representatives will elect the president.

Election '88's main objective is to keep track of the electoral votes as election-day results become available. Entering the votes by state is the first option on the program menu. If you choose to enter state votes, Option 1, you are asked for the two-letter postal abbreviation of the appropriate state. The program then presents that state's number of electoral votes. The program then asks you to identify who has received the electoral votes by pressing the initial letter of the following choices: Democrat, Republican or Undecided. After you have entered this information, the program will ask you for the next state. When you have entered all current information, type `XX` to exit Option 1. Your responses are then added to previous information and the results are tabulated.

Option 2 presents an onscreen current status report, which shows the total votes accrued by both parties and indicates how each state has voted. Option 3 gives you the same information on a one-page printout. These options will help you keep track of the electoral votes and predict the outcome of the election — just like the pros.

Option 4 adds a touch of magic to the program. A map of the United States is created. As you identify the winning party in each state, the state is painted the appropriate color. Use this option to illustrate the evening's progress, or use the map to reinforce your children's (or your) knowledge of United States geography. There might even be a lesson or two about party distribution or a candidate's campaign practices in this map. You decide.

Option 5 is a History Submenu, which (as the heading suggests) sends the program to a submenu that presents four options:

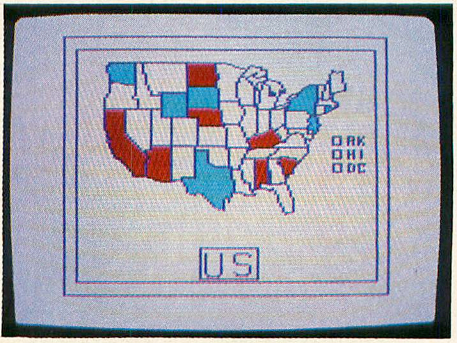
1. Democratic Tickets (1920 —)
2. Republican Tickets (1920 —)
3. U.S. Presidents (1920 to 1984)
4. Electoral College Facts

Selecting any one of these options sends you (or your child) to an information screen, which elaborates on the chosen subject. (This way, we won't just tally the electoral votes, we'll know how they work.

Menu Option 6 allows the user to save the data entries in progress and load them again at a later time. This will be most useful when using the last menu option to play "Political Predictions." Political Predictions is an option that lets you make a game out of the selection process. For this, gather the family around on or before Election Eve and let them guess which candidate will carry each state. After the final tabulations are in, *Election '88* will determine just how well the predictions match those of the electorate at large.

Election '88's program structure is straightforward and simple. You should have little trouble following the program logic. The first few lines dimension the necessary data space and display the title screen. Next, program data is listed and read into memory. Be careful typing these data statements. They must be accurate. Next, the main menu information is listed. (See `REM` statements in the program.) The routines for each function follow. The routine that deals with state results (Option 1) provides the information needed for the other options.

For the map routine, I used `DATA` statements to provide the `LINE` statements with needed information. (This shortened the length of the code needed and the typing required to enter it.) After the program creates the map for the first time, it gets the entire U.S. map as a graphic array. Therefore, when the program recalls the map, it puts the map on screen and skips the data section of the program. This solves all the programming problems and presents the map almost instantly. Users do not have to wait for the `DRAW` statement to perform its laborious task each time the map is called.



Typing in and running *Election '88* should present no serious problems *if* you enter the correct data, including all commas. If you have any problems with the program, look at the appropriate `DATA` statements.

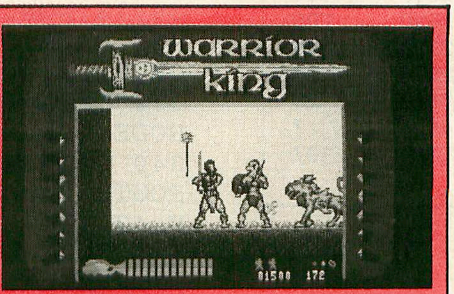
Enjoy *Election '88*. Let's hope "our" candidate wins!

(Questions or comments concerning this program may be directed to the author at P.O. Box 403, Cambridge MD 21613. Please include an SASE when requesting a reply.) ☐

Leonard Hyre is the author of Federal Hill Software's Handicapper *series and a number of articles for* RAINBOW. *He also published several articles in* RAINBOW*'s sister publication, PCM, and is the author of* Sanyopoly, *a new Sanyo game from Michigan Software.*

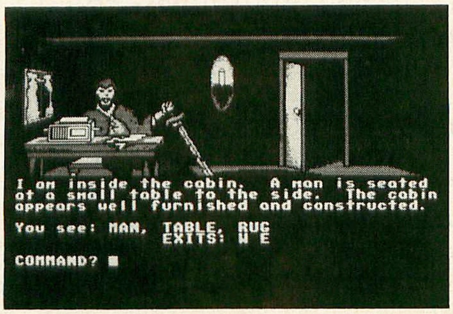
SUNDOG SYSTEMS

Warrior King



Become RASTANN, Warrior King, on the quest to regain his rightful crown, hidden deep within a sinister land. Battle monsters, gain magic and weapons, and travel through harsh wilderness and dark castle dungeons in this medieval realm. From the creator of *Kung-Fu Dude* comes this awesome arcade game for the CoCo III! *Warrior King* uses the most detailed 320x200 16 color graphics and high speed machine code to vault you into a world of fantasy. Dare ye challenge the many perils ahead in order to become WARRIOR KING? Req. 128K CoCo III, disk drive, and joystick. Only $29.95.

In Quest of the Star★Lord



```
I am inside the cabin.  A man is seated
at a small table to the side.  The cabin
appears well furnished and constructed.

You see: MAN, TABLE, RUG
         EXITS: W E

COMMAND? ■
```

This is THE graphic adventure for the CoCo III! Unparalleled 320x200 animated graphics will leave you gasping for more! You quest for the Phoenix Crossbow in this post-holocaust world of science and fantasy. *In Quest of the Star Lord* is a full 4 disk sides of mind-numbing adventure! Req. 128K CoCo III and disk drive. Only $34.95. Hint Sheet: $3.95.

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— 8/88 Rainbow review

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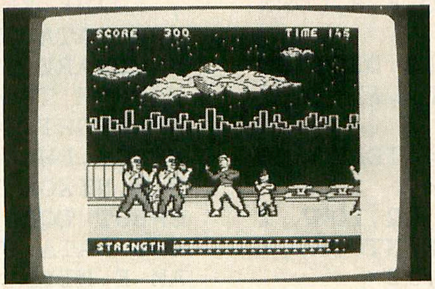
— 2/88 Rainbow review



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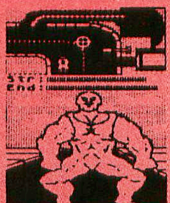

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840	248	2050	86	4010	23
1020	4	2230	139	4504	7
1184	206	2340	190	END	197

The listing: ELECTION

```
10 '****************************
20 '*      ELECTION 88         *
30 '*    (C) 7/88 L HYRE       *
40 '*     CAMBRIDGE  MD        *
50 '* **************************
60 '
100 DIM M(600):REM MAP ARRAY
110 DIM LS$(51),S$(51),S(51),EV(
51),DP$(17),DV$(17),RP$(17),RV$(
17),OV(51),DW(51),SV(51),WN(17),
PP(51)
120 '
130 '***** TITLE SCREEN *****
140 '
150 CLS5:PRINT STRING$(64,175);
160 FOR X=2TO14 STEP 2:PRINT@X*3
2, STRING$(32,159);:NEXT
170 FOR X=170 TO 298 STEP 32:PRI
NT@X,STRING$(12," ");CHR$(128);:
NEXT:PRINT@182,CHR$(207);
180 PRINT@331,STRING$(12,128);
190 PRINT@203,"*ELECTION*";:PRIN
T@237,"* 88 *";:PRINT@268,"COVER
AGE";:PRINT@299,"BY RAINBOW";
200 '
210 ' ***** PROGRAM DATA *****
220 '
230 DATA ALABAMA,AL,1,9,ALASKA,A
K,2,3,ARIZONA,AZ,3,7
240 DATA ARKANSAS,AR,4,6,CALIFOR
NIA,CA,5,47,COLORADO,CO,6,8,CONN
ECTICUT,CN,7,8
250 DATA DELAWARE,DE,8,3,DIST OF
 COLUMBIA,DC,9,3,FLORIDA,FL,10,2
1,GEORGIA,GA,11,12
260 DATA HAWAII,HI,12,4,IDAHO,ID
,13,4,ILLINOIS,IL,14,24
270 DATA INDIANA,IN,15,12,IOWA,I
O,16,8,KANSAS,KS,17,7,KENTUCKY,K
Y,18,9,LOUISIANA,LA,19,10
280 DATA MAINE,ME,20,4,MARYLAND,
MD,21,10,MASSACHUSETTS,MA,22,13,
MICHIGAN,MI,23,20
290 DATA MINNESOTA,MN,24,10,MISS
ISSIPPI,MS,25,7,MISSOURI,MO,26,1
1,MONTANA,MT,27,4
300 DATA NEBRASKA,NE,28,5,NEVADA
,NV,29,4,NEW HAMPSHIRE,NH,30,4,N
EW JERSEY,NJ,31,16
310 DATA NEW MEXICO,NM,32,5,NEW
YORK,NY,33,36,NORTH CAROLINA,NC,
34,13,NORTH DAKOTA, ND,35,3
320 DATA OHIO,OH,36,23,OKLAHOMA,
OK,37,8,OREGON,OR,38,7
330 DATA PENNSYLVANIA,PA,39,25,R
HODE ISLAND,RI,40,4
340 DATA SOUTH CAROLINA,SC,41,8,
SOUTH DAKOTA,SD,42,3,TENNESSEE,T
N,43,11,TEXAS,TX,44,29
350 DATA UTAH,UT,45,5,VERMONT,VT
,46,3,VIRGINIA,VA,47,12
360 DATA WASHINGTON,WA,48,10,WES
T VIRGINIA,WV,49,6,WISCONSIN,WI,
50,11,WYOMING,WY,51,3
370 DATA JAMES M. COX,FRANKLIN D
. ROOSEVELT,JOHN W. DAVIS,CHARLE
S W. BRYAN,ALFRED E. SMITH,JOSEP
H T. ROBINSON,FRANKLIN D. ROOSEV
ELT,JOHN N. GARNER,FRANKLIN D. R
OOSEVELT, JOHN N. GARNER,FRANKLI
N D. ROOSEVELT, HENRY A. WALLACE
380 DATA FRANKLIN D. ROOSEVELT,
HARRY S. TRUMAN, HARRY S. TRUMAN
, ALBEN W. BARKLEY, ADLAI E. STE
VENSON, JOHN J. SPARKMAN, ADLAI
E. STEVENSON, ESTES KEFAUVER, JO
HN F. KENNEDY, LYNDON B. JOHNSON
, LYNDON B. JOHNSON, HUBERT H. H
UMPHREY
390 DATA HUBERT H. HUMPHREY, EDM
UND S. MUSKIE, GEORGE S. MCGOVER
N, R. SARGENT SHRIVER JR., JIMMY
 CARTER, WALTER F. MONDALE, JIMM
Y CARTER, WALTER F. MONDALE
400 DATA WALTER F. MONDALE, GERA
LDINE FERRARO
410 DATA WARREN G. HARDING, CALV
IN COOLIDGE, CALVIN COOLIDGE, CH
ARLES D. DAWES, HERBERT HOOVER,
CHARLES CURTIS, HERBERT HOOVER,
CHARLES CURTIS, ALFRED M. LANDON
, FRANK KNOX
420 DATA WENDELL L.WILKIE,CHARLE
S MCNARY,THOMAS E.DEWEY,JOHN W.B
RICKER,THOMAS E.DEWEY,EARL WARRE
N,DWIGHT D.EISENHOWER,RICHARD M.
NIXON,DWIGHT D.EISENHOWER,RICHAR
D M.NIXON,RICHARD M.NIXON,HENRY
CABOT LODGE
430 DATA BARRY M.GOLDWATER,WILLI
AM E.MILLER,RICHARD M.NIXON,SPIR
O T.AGNEW,RICHARD M.NIXON,SPIRO
T.AGNEW,GERALD R.FORD,ROBERT J.D
OLE,RONALD REAGAN,GEORGE BUSH,RO
NALD REAGAN,GEORGE BUSH
440 DATA 152,100,212,78,76,92,13
2,88
450 DATA 44,80,92,72,200,52,192,
70
```

```
460 DATA 212,98,172,116,164,100,
212,88
470 DATA 64,44,144,60,156,60,128
,56
480 DATA 108,76,160,76,136,108,2
12,32
490 DATA 184,70,204,48,160,48,12
8,36
500 DATA 144,100,132,72,80,32,10
8,60
510 DATA 60,72,204,44,196,64,92,
92
520 DATA 188,48,176,84,108,28,16
4,60
530 DATA 120,88,48,44,184,64,209
,53
540 DATA 176,98,108,44,160,84,11
6,108
550 DATA 76,72,200,40,180,76,48,
28
560 DATA 172,72,140,40,88,52
570 DATA 2,2,2,1,1,1,1,1,2,2,1,1
,2,2,1,2,2
580 '
590 '****** READ IN DATA ******
600 '
610 FOR X=1 TO 51:READ LS$(X),S$
(X),S(X),EV(X):NEXT
620 FOR X=1TO17:READDP$(X),DV$(X
):NEXT:FOR X=1TO17:READRP$(X),RV
$(X):NEXT
630 FOR X=1 TO 51:READ OV(X):REA
D DW(X):NEXT X
640 FOR X=1 TO 17:READ WN(X):NEX
T X
650 '
660 '**EXIT TITLE AFTER READ**
670 '
680 PRINT@464,"<PRESS ANY KEY>";
690 AK$=INKEY$:IF AK$=""THEN 690
700 '
710 '***** MAIN MENU HERE *****
720 '
730 CLS:PRINT STRING$(32,175);:P
RINT@33,"ELECTION COVERAGE BY RA
INBOW";:PRINT@64, STRING$(32,159
);
740 PRINT:PRINT"        MENU SELE
CTIONS....":PRINT:PRINT"   1>ENT
ER VOTING RESULTS":PRINT"   2>VI
EW  CURRENT VOTE STATUS":PRINT"
  3>PRINT CURRENT VOTE STATUS"
750 PRINT"   4>U.S.MAP WITH VOTE
 STATUS":PRINT"   5>HISTORY SUBM
ENU"
755 PRINT"   6>SAVE OR LOAD DATA
 FILE":PRINT"   7>PLAY";CHR$(34)
;"POLITICAL PREDICTION";CHR$(34)
760 PRINT:PRINT"      PRESS # OF S
ELECTION---";
770 AK$=INKEY$:IF AK$=""THEN 770
```

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```
780 IF VAL(AK$)>7 THEN 770
790 IF AK$="1" THEN GOSUB 880
800 IF AK$="2" THEN GOSUB 1120
810 IF AK$="3" THEN GOSUB 1330
820 IF AK$="4" THEN GOSUB 1520
830 IF AK$="5" THEN GOSUB 1620
832 IF AK$="6" THEN GOSUB 4000
834 IF AK$="7" THEN GOSUB 4500
840 GOTO 730
850 '
860 '**** STATE RESULTS ****
870 '
880 CLS:PRINT STRING$(32,159):PR
INT@35,"VOTING RESULT ENTRY SCRE
EN":PRINT STRING$(32,175);
890 PRINT@448,STRING$(32,128);:P
RINT@484,"<ENTER XX FOR MAIN MEN
U>";
900 PRINT@128,"ENTER STATE ABBRE
VIATION";:INPUT ST$
910 IF ST$="XX"THEN RETURN
920 FOR TEST=1 TO 51:IF ST$=S$(T
EST) THEN 950
930 NEXT TEST
940 PRINT@128,"NO SUCH ABBREVIAT
ION! TRY AGAIN!":SOUND 1,1:FOR X
=1 TO 800:NEXT:GOSUB 3070:GOTO 8
80
950 PRINT:PRINT"THE STATE OF ";L
S$(TEST):PRINT"WITH (";EV(TEST);
") VOTES HAS VOTED:"
960 PRINT"<D>EMOCRAT   <R>EPUBLI
CAN"
970 PRINT"<U>NDECIDED":PRINT:PRI
NT"ENTER D, R, OR U "
980 AK$=INKEY$:IF AK$=""THEN 980
990 SV(TEST)=0:IF AK$="U" THEN 1
070
1000 IF AK$="D" THEN SV(TEST)=1
1010 IF AK$="R" THEN SV(TEST)=2
1020 DV=0:RV=0
1030 FOR X=1 TO 51
1040 IF SV(X)=1 THEN DV=DV+EV(X)
1050 IF SV(X)=2 THEN RV=RV+EV(X)
1060 NEXT X
1070 GOSUB 3070:GOTO 880
1080 RETURN
1090 '
1100 '** SCREEN STATUS REPORT **
1110 '
1120 CLS:PRINT"UPDATE OF CURRENT
 STATUS":PRINT STRING$(32,175);"
NEEDED TO WIN: 270 VOTES"
1130 PRINT@96,"DEMOCRATIC CURREN
T TOTAL =";:PRINT USING"###";DVD
V
1140 PRINT@128,"REPUBLICAN CURRE
NT TOTAL =";:PRINT USING"###";RV
1150 PRINT STRING$(32,159);:PRIN
T"STATE/DC    VOTES   RESULTS"
1160 ZZ=1:XC=0:XV=0
```

```
1170 FOR X=224 TO 384 STEP 32:PR
INT@X,LS$(ZZ)
1180 PRINT @X+16,;:PRINT USING"#
#";EV(ZZ)
1182 XT$=" "
1183 IF SV(ZZ)=1 AND PP(ZZ)=1 TH
EN XT$="*":XC=XC+1
1184 IF SV(ZZ)=2 AND PP(ZZ)=2 TH
EN XT$="*":XC=XC+1
1190 IF SV(ZZ)=1 THEN PRINT@X+19
,"DEMOCRATIC";XT$:ELSE IF SV(ZZ)
=2 THEN PRINT@X+19,"REPUBLICAN";
XT$:ELSE PRINT@X+19,"-----------
";XT$
1191 IF SV(ZZ)<>0 THEN XV=XV+1
1200 ZZ=ZZ+1
1210 IF ZZ/6=INT(ZZ/6) THEN 1220
 ELSE GOTO 1250
1220 PRINT:PRINT"<PRESS ANY KEY>
"
1230 AK$=INKEY$:IF AK$=""THEN 12
30
1240 FOR Y=224 TO 416 STEP 32:PR
INT@Y,STRING$(32," "):NEXT Y:GOT
O 1170
1250 IF ZZ=51 THEN 1265
1260 NEXT X
1265 IF XV>0 THEN PRINT:PRINT"YO
UR PREDICTIONS:":PRINT"YOU HAVE
";XC;"OUT OF";XV;"CORRECT":PRINT
"FOR A";INT((XC/XV)*100);" % ACC
URACY RATE."
1270 PRINT@448,STRING$(32,128);:
PRINT@488,"< PRESS ANY KEY >";
1280 AK$=INKEY$:IF AK$=""THEN 12
80
1290 RETURN
1300 '
1310 '** PRINTOUT STATUS **
1320 '
1330 CLS:PRINT STRING$(32,159):P
RINT@38,"PRINTOUT CURRENT STATUS
":PRINT STRING$(32,175);
1340 PRINT:PRINT"MAKE SURE PRINT
ER IS READY!"
1350 PRINT:PRINT"PRESS <P> TO PR
INT":PRINT
1360 PRINT"ANY OTHER KEY TO RETU
RN TO MENU"
1370 AK$=INKEY$:IF AK$=""THEN 13
70
1380 IF AK$="P"THEN 1390 ELSE GO
SUB 3070:RETURN
1390 PRINT#-2,STRING$(80,"-"):PR
INT#-2,"ELECTION NIGHT 88 - COVE
RAGE BY RAINBOW           *=CORR
ECT PREDICTION"
1400 PRINT#-2,STRING$(80,"-")
1405 XC=0:XV=0
1410 FOR X=1 TO 51:PRINT#-2,LS$(
X);:PRINT #-2,TAB(24);S$(X);:PRI
```

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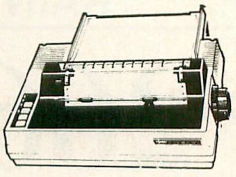

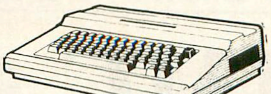

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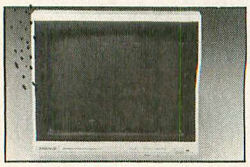
Hundreds of $ off Monitors sighted as Major Factor. HMC is reported to have made a special purchase on Magnavox monitors. These items, listed, are being offered at remarkable savings.

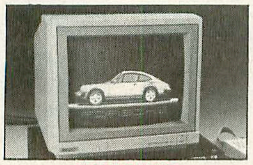
MAGNAVOX 7622 12″ Amber Screen offers 900 dots × 350 lines resolution at 20 MHz on a dark glass anti-glare CRT with built-in audio and 1 year warranty. ($7 shipping) **$88** 7652 green screen also available $88

MAGNAVOX 8CM 515 has analog RGB for CoCo 3, TTL RGB for Tandy 1000• or IBM PC's, and composite color for CoCo 2 and 3. Built-in speaker. 14″ screen with 640 dot × 240 line resolution. Plus 2 years parts and labor warranty. reg. list $499 **was $298** **$266** + $14 Shipping

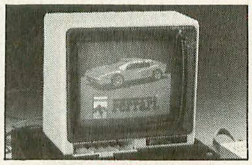
CC-3 Magnavox RGB cable only $19.95 with Magnavox Monitor order. $29.95 w/o monitor.



7622



8CM515



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123A 12″ This 12″ green screen high resolution monitor offers 80 column capability, Zenith quality and a 90-day warranty valid at any of Zenith's 1200 locations. Retail $199. **Our price $67.50** ($7 shipping) **REPACK**

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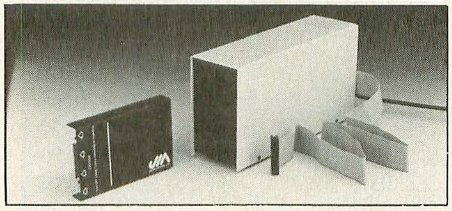

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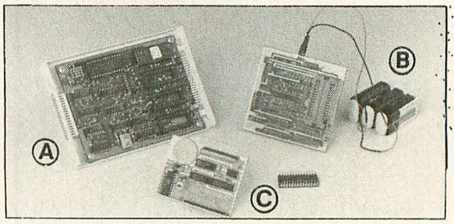

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```
NT#-2,TAB(40);"Votes =";
1411 XT$=" "
1420 PRINT #-2,USING "##";EV(X);
1421 IF SV(X)=1 AND PP(X)=1 THEN
 XT$="*":XC=XC+1
1422 IF SV(X)=2 AND PP(X)=2 THEN
 XT$="*":XC=XC+1
1423 IF SV(X)<>0 THEN XV=XV+1
1430 IF SV(X)=1 THEN PRINT#-2,TA
B(58);"DEMOCRATIC";XT$
1440 IF SV(X)=2 THEN PRINT#-2,TA
B(58);"REPUBLICAN";XT$
1450 IF SV(X)=0 THEN PRINT#-2,TA
B(58);"----------"
1460 NEXT X
1470 PRINT#-2,STRING$(80,"-"):PR
INT#-2,"DEMOCRATS HAVE ";DV;" VO
TES.";:PRINT#-2,TAB(40);"REPUBLI
CANS HAVE ";RV;" VOTES."
1475 IF XV>0 THEN PRINT#-2,"YOUR
 PREDICTIONS:";XC;" OUT OF ";XV;
" FOR A ";INT((XC/XV)*100);"% CO
RRECT SELECTON RATE"
1480 RETURN
1490 '
1500 '**** MAP FUNCTIONS ****
1510 '
1520 GOSUB 2330
1530 FOR X=1 TO 51
1540 IF SV(X)=1 THEN PAINT(OV(X)
,DW(X)),0,3
1550 IF SV(X)=2 THEN PAINT(OV(X)
,DW(X)),2,3
1560 NEXT X
1570 AK$=INKEY$:IF AK$=""THEN 15
70
1580 RETURN
1590 '
1600 '**** HISTORY SUBMENU ****
1610 '
1620 CLS:PRINT STRING$(32,159);"
* HISTORICAL INFORMATION  MENU *
";STRING$(32,207)
1630 PRINT@129,"1> DEMOCRATIC TI
CKETS (1920-)"
1640 PRINT@161,"2> REPUBLICAN TI
CKETS (1920-)"
1650 PRINT@193,"3> U.S.PRESIDENT
S (1920-1984)":PRINT@225,"4> ELE
CTORAL COLLEGE FACTS"
1660 PRINT@289,"ENTER 1,2,3 OR 4
 TO SELECT-"
1670 PRINT@321,"ANY OTHER KEY FO
R MAIN MENU"
1680 FY=1920
1690 AK$=INKEY$:IF AK$=""THEN 16
90
1700 IF VAL(AK$)>4 THEN SOUND 1,
```

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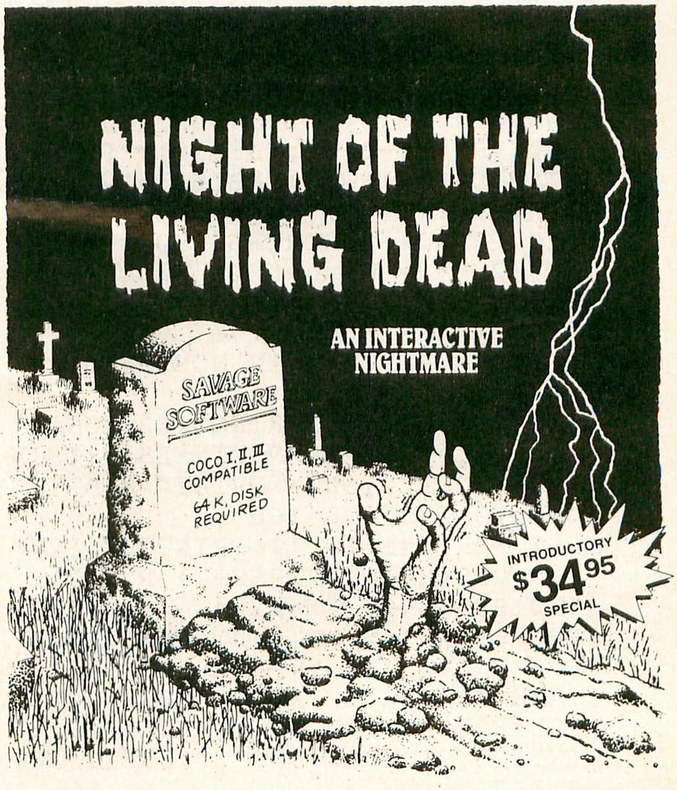

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```
1:GOTO 1690
1710 IF AK$="1" THEN 1790
1720 IF AK$="2" THEN 1950
1730 IF AK$="3" THEN 2110
1740 IF AK$="4" THEN 2250
1750 RETURN
1760 '
1770 '** DEMOCRATIC NOMINEES **
1780 '
1790 CLS:PRINT STRING$(32,159);"
DEMOCRATIC PARTY NOMINEES-":PRIN
T STRING$(32,207):PRINT" YEAR...
.CANDIDATES":SS=160
1800 FOR X=1 TO 17:PRINT@SS,FY;"
   ";DP$(X):PRINT@SS+41,DV$(X)
1810 SS=SS+96:FY=FY+4
1820 IF X/3<>INT(X/3) THEN 1840
ELSE PRINT@480,"<PRESS ANY KEY>"
;:AK$=INKEY$:IF AK$=""THEN 1820
1830 FOR WP=160 TO 384 STEP 32:P
RINT@WP,STRING$(32," "):NEXT WP:
SS=160
1840 NEXT X
1850 PRINT@480,"<P=PRINT-ANY OTH
ER=MAIN MENU>";
1860 AK$=INKEY$:IF AK$=""THEN 18
60 ELSE IF AK$="P"THEN 1870 ELSE
 RETURN
1870 PRINT#-2,STRING$(80,"-"):PR
INT#-2,"DEMOCRATIC CANDIDATES FO
R PRESIDENT/VICE PRESIDENT (1920
-1984)":PRINT#-2,STRING$(80,"-")
1880 FY=1920:FORX=1TO17
1890 IF WN(X)=1 THEN WN$="*" ELS
E WN$=""
1900 PRINT#-2,FY;TAB(10);"PRESID
ENT:";DP$(X);WN$;TAB(50);"VP:";D
V$(X):PRINT#-2,"":FY=FY+4:NEXT X
1910 PRINT#-2,STRING$(80,"-"):PR
INT#-2,"* = Winner In Election":
RETURN
1920 '
1930 '** REPUBLICAN NOMINEES **
1940 '
1950 CLS:PRINT STRING$(32,159);"
REPUBLICAN PARTY NOMINEES-":PRIN
T STRING$(32,207):PRINT" YEAR...
.CANDIDATES":SS=160
1960 FOR X=1 TO 17:PRINT@SS,FY;"
   ";RP$(X):PRINT@SS+41,RV$(X)
1970 SS=SS+96:FY=FY+4
1980 IF X/3<>INT(X/3) THEN 2000
ELSE PRINT@480,"<PRESS ANY KEY>"
;:AK$=INKEY$:IF AK$=""THEN 1980
1990 FOR WP=160 TO 384 STEP 32:P
RINT@WP,STRING$(32," "):NEXT WP:
SS=160
2000 NEXT X
2010 PRINT@480,"<P=PRINT-ANY OTH
ER=MAIN MENU>";
2020 AK$=INKEY$:IF AK$=""THEN 20
20 ELSE IF AK$="P"THEN 2030 ELSE
 RETURN
2030 PRINT#-2,STRING$(80,"-"):PR
INT#-2,"REPUBLICAN CANDIDATES FO
R PRESIDENT/VICE PRESIDENT (1920
-1984)":PRINT#-2,STRING$(80,"-")
2040 FY=1920:FORX=1TO17
2050 IF WN(X)=2 THEN WN$="*" ELS
E WN$=""
2060 PRINT#-2,FY;TAB(10);"PRESID
ENT:";RP$(X);WN$;TAB(50);"VP:";R
V$(X):PRINT#-2,"":FY=FY+4:NEXT X
2070 PRINT#-2,STRING$(80,"-"):PR
INT#-2,"* = Winner In Election":
RETURN
2080 '
2090 '**** PRESIDENTS ****
2100 '
2110 CLS:PRINT STRING$(32,207);"
PRESIDENTS OF THE UNITED STATES
";STRING$(32,159)
2120 FOR X=1 TO 17
2130 IF X=9 THEN 2140 ELSE 2160
2140 PRINT:PRINT"<PRESS ANY KEY>
"
2150 AK$=INKEY$:IF AK$=""THEN 21
50 ELSE:FOR WP=128 TO 448 STEP 3
2:PRINT@WP,STRING$(32," ");:NEXT
 WP:PRINT@128,"";
2160 IF WN(X)=1 THEN PRINT FY;"
  ";DP$(X)
2170 IF WN(X)=2 THEN PRINT FY;"
  ";RP$(X)
2180 FY=FY+4
2190 NEXT X
2200 PRINT@448,"<PRESS ANY KEY>"
;
2210 AK$=INKEY$:IF AK$=""THEN 22
10 ELSE RETURN
2220 '
2230 '** ELECTORAL COLLEGE **
2240 '
2250 CLS:PRINTSTRING$(32,159):PR
INT@38,"ELECTORAL COLLEGE":PRINT
STRING$(32,207);
2260 PRINT"   THE PRESIDENT AND
VP ARE":PRINT"ELECTED  BY THE  E
LECTORAL":PRINT"COLLEGE. EACH ST
ATE AND DC HAVE AS MANY ELECTORS
 AS SENATORS":PRINT"AND REPRESEN
TATIVES.WE ACTUALLY":PRINT"VOTE
FOR ELECTORS."
2270 PRINT"   THERE ARE 538 VOTE
S. TO WIN, A CANDIDATE NEEDS 270
 VOTES. IF":PRINT"NO CANDIDATE G
ETS THE NEEDED":PRINT"MAJORITY,
THE HOUSE AND SENATE":PRINT"ELEC
T THE PRESIDENT."
2280 PRINT@484,"<PRESS ANY KEY>"
;
2290 AK$=INKEY$:IF AK$=""THEN 22
```

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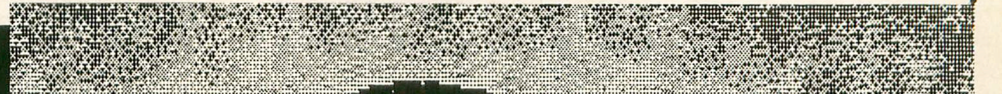

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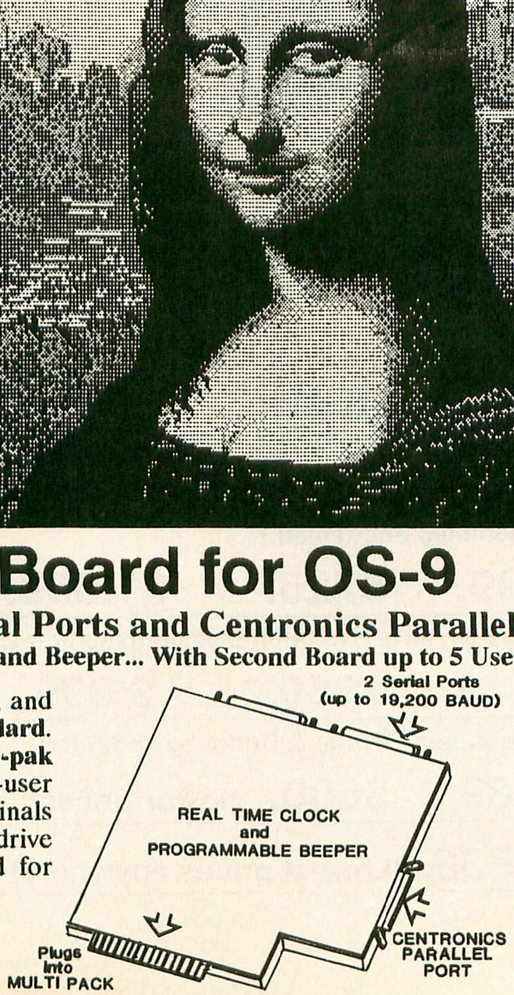

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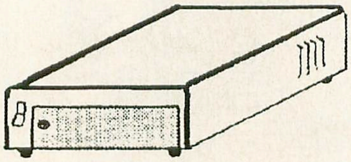

10 Meg.	20 Meg.	40 Meg.	80 Meg. (2 X 40 Meg.)

System Prices: (Includes Hard Drive, Controller, LR Tech Interface, Software. Fully assembled and tested.)

$469.	$599.	$725.	$1,069.

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OWL Hard Drive BASIC 3

There have been several ads in this magazine about BASIC for Color Computer hard drive systems. These ads sometimes only tell a part of the story. Our BASIC system price includes **assembly**, **testing**, and **3-day burn-in** period. We do not require a Multi-pak to operate.

Our hard drive systems are fast, reliable, and reasonable in price. This has been proven by hundreds of users over the past 3 years. We do not have to turn off error checking for speed. We achieve high speed BASIC from a unique indexing method.

The table below will summarize some of the key points about our BASIC hard drive system and two other systems. We believe that we have the best BASIC interface for CoCo hard drives available.

BASIC Hard Drive Systems*

Feature	OWL	B&B	RGB
Drive Portion Available	Entire	Entire(?)	Entire
User Sets BASIC/OS-9 Partitions	YES	Yes	No
Add to Existing OS-9 Drive Without Reformat	YES	Yes(?)	No
Drives 0-3 Hard/Floppy	YES	No	Yes
Built in Park	YES	No	Yes
Speed*	FAST	Fast	Fast

*All feature details are believed to be true at time of writing and are subject to change. We believe that our BASIC hard drives are the fastest due to our indexing method, but all three systems are fast. On ours all BASIC commands work including DSKINI, DSKI$, and DSKO$.

Prices: With/Without Hard Drive

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500 501 or 502

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 5 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

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Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

OWL DOS

An operating system that gives faster disk access and allows the use of double-sided drives. Corrects a floating point number error on early CoCo systems.

COPY-IT

Quickly copies selected programs between disks. A wild card option selects groups of programs to copy.

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Verifies reading of each sector. Bad sectors are listed on the screen.

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We will select 2 games from our stock. These sold for more than $20 each.

If sold separately this is more than $125 worth of software!!

Do not mistake this software with cheap, non-professional "Public Domain" software which is being offered by others. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

only $27.95
(or even better)
only $6.95 with
any Disk Drive Purchase!!

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OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

OWL-WARE
P.O. BOX 116
Mertztown, PA 19539

```
90 ELSE RETURN
2300 '
2310 '****** U.S.MAP ******
2320 '
2330 PMODE3,1:PCLS5:SCREEN1,1:CO
LOR3,1
2340 LINE(0,0)-(255,191),PSET,B
2350 LINE(10,10)-(245,181),PSET,
B
2360 DRAW"BM110,160;D15F2R8E2U15
"
2370 LINE(106,156)-(150,179),PSE
T,B
2380 DRAW"BM134,160;BR10BD2H2L8G
2D4F2R8F2D4G2L8H2"
2390 LINE(36,20)-(36,22),PSET
2400 IF MP=2 THEN PUT(30,20)-(22
0,135),M:GOTO 2890
2410 DATA6,34,22,36,34,36,41,33,
47,32,64,35,75
2420 GOSUB 2960:DRAW"R2D2L2"
2430 DATA7,41,89,45,90,54,101,54
,103,64,103,77,107,87,107
2440 GOSUB2960:DRAW"U1R5"
2450 DATA42,97,112,97,115,103,11
7,104,115,109,116,116,125,124,12
8,124,122,126,118,129,122,130,11
5,139,115,141,117,148,117
2460 DATA 145,113,156,112,160,11
4,163,112,167,118,167,121,171,12
7,171,129,173,131,178,129,178,12
1,177,116,172,107,175,102,178,10
1,179,98,191,85,189,75,193,77,19
4,75,194,72,197,72,200,65,198,64
,199,61,197,59,207,56,212,53
2470 GOSUB 2960:DRAW"U2R2D1":LIN
E-(215,51),PSET:DRAW"U2L2U1L2U6"
2480 DATA12,220,40,221,35,218,34
,218,26,215,27,210,25,207,35,204
,36,192,36,181,43,178,43,174,47
2490 GOSUB 2960:DRAW"R2D2L2"
2500 DATA2,163,54,168,43,2,169,3
4,159,32,4,147,22,142,25,126,20,
36,20,36,34,39,35
2510 GOSUB 2960:DRAW"U3R2D2R2U2"
:GOSUB2960:DRAW"U7L4U2":GOSUB296
0:GOSUB3030:DRAW"U2"
2520 DATA2,48,36,57,36,57,20,57,
44,3,55,46,58,47,58,53
2530 GOSUB2960:GOSUB3030:GOSUB29
60
2540 DATA2,32,54,75,54,49,54,49,
72,4,65,87,67,90,64,93,64,103
2550 GOSUB3000:GOSUB2960
2560 DATA68,54,68,84,2,67,37,69,
44,6,75,42,97,42,76,60,105,60,84
,60,84,107,68,81,127,81,105,60,1
05,81,102,81,102,104
2570 GOSUB3030:DRAW"L3D3":DRAW"B
M62,20;D8R2D8":GOSUB2960:DRAW"R7
U2D18R21U40":GOSUB3000
2580 DATA2,92,104,92,106,102,84,
112,84,4,112,93,119,96,131,96,13
3,115,119,20,119,26
2590 GOSUB2960:GOSUB3030:GOSUB29
60
2600 DRAW"BM127,81;D2R2D14":GOSU
B3030
2610 DATA3,121,29,118,37,97,37,1
18,37,121,40,5,121,54,118,53,117
,54,115,53,97,53,121,53,123,56,4
,122,62,125,66,127,69,127,81
2620 GOSUB2960:GOSUB3030:GOSUB29
60:GOSUB3030:GOSUB2960
2630 DATA2,105,66,125,66,143,25,
136,32,3,134,40,137,51,148,51,2,
121,48,135,48,138,51,141,57,2,13
7,65,124,65,149,51,150,53
2640 GOSUB3000:DRAW"D2L2":GOSUB2
960:DRAW"D1R2":GOSUB3000:GOSUB29
60:GOSUB3030
2650 DATA5,151,56,151,70,149,73,
145,75,143,78,137,65,145,81,142,
84,137,97,137,97,139,100,4,138,1
03,140,108,144,108,145,113,2,139
,90,168,90,149,90,148,112,158,90
2660 GOSUB2960:GOSUB3030:DRAW"D3
L3U2L14":GOSUB3030:DRAW"D1L6":GO
SUB3030:GOSUB2960:GOSUB3000:DRAW
"R4U4R8":GOSUB2990:DRAW"DM159,10
9;R9U1R4"
2670 PAINT(128,56),2,1
2680 DATA173,104,168,93,169,89,1
80,90,183,93,158,90,160,87,2,163
,87,168,82,149,73,150,74,4,153,7
2,154,72,160,69,160,54,160,67,16
1,69,10,162,68,165,70,170,78,173
,78,174,74,177,73,178,72,181,71,
187,72,189,77
2690 GOSUB3030:DRAW"D1L2":GOSUB2
990:DRAW"R5D1R6":GOSUB3030
2700 DRAW"BM144,83;R4U1R41"
2710 GOSUB3030:GOSUB2960:GOSUB30
30
2720 GOSUB2960:GOSUB3030:GOSUB29
60
2730 DATA2,163,81,168,78,136,31,
140,30,6,144,34,146,34,148,40,15
1,38,149,44,148,51,142,31,150,27
,7,149,30,152,31,156,29,159,33,1
55,34,150,35,149,39,159,33,155,3
7,3,153,43,153,47,150,53,157,35,
161,37
2740 GOSUB3000:GOSUB2960:GOSUB30
30
2750 GOSUB2960:GOSUB3030:GOSUB29
60:GOSUB3030
2760 DRAW"D7R2U3"
```

```
2770 DATA2,165,42,166,47,150,54,
169,54,4,176,50,176,47,183,44,18
4,42,172,52,172,68,3,191,68,194,
69,194,72,172,64,169,67,164,70,1
93,58,192,58,191,63,2,193,64,191
,68,197,51,209,51,210,54
2780 GOSUB2960:GOSUB3030:GOSUB29
60:GOSUB3030:GOSUB2960
2790 DRAW"BM189,68;D3R6"
2800 GOSUB3030:GOSUB2990
2810 DRAW"BM175,68;D4R5"
2820 DRAW"BM175,51;D4R13"
2830 GOSUB2990:DRAW"R4U9R2U12"
2840 GOSUB3030:GOSUB2960:GOSUB30
30:GOSUB2990:GOSUB3000:GOSUB2990
2850 DATA2,205,51,205,57,199,46,
207,47,210,44,204,36,205,39,2,20
3,43,203,47,209,32,208,35,2,209,
43,210,43,202,60,209,58,3,210,60
,206,61,202,60
2860 GOSUB 3030:GOSUB2960:GOSUB3
030:GOSUB2960
2870 DRAW"BM189,69;C5D2R3":DRAW"
BM190,69;C3D3R2"
2880 IF MP<>2 THEN GET(30,20)-(2
20,135),M:MP=2
2890 DRAW"BM210,80;U6R6D6L6BR12U
6R4D6U3L4BR9BD3U6BR4G3F3"
2900 DRAW"BM210,90;U6R6D6L6BR12U
6D3R5U3D6BR6U6"
2910 DRAW"BM210,100;U6R6D6L6BR12
U6R3F1D4G1L3BR9U6R3F1BD4G1L3"
2920 RETURN
2930 '
2940 '** READ MAP ONCE ONLY **
2950 '
2960 READA
2970 FORX=1 TO A:READ B,C
2980 LINE-(B,C),PSET:NEXTX:RETUR
N
2990 READA,B:LINE-(A,B),PSET:RET
URN
3000 READA
3010 FOR X=1 TO A:READB,C,D,E
3020 LINE(B,C)-(D,E),PSET:NEXTX:
RETURN
3030 READA,B,C,D:LINE(A,B)-(C,D)
,PSET:RETURN
3040 '
3050 '** SCREEN CLEANUP **
3060 '
3070 FOR WIPE=128 TO 416 STEP 32
:PRINT@WIPE,STRING$(32," ");:NEX
T:RETURN
4000 CLS:PRINT STRING$(32,175):P
RINT"LOAD OR SAVE DATA FILES..."
:PRINT STRING$(32,159)
4002 PRINT"CHOOSE 1>CASSETTE 2>D
ISK ":INPUT CD$
4004 PRINT"DATA FILES WILL INCLU
DE VOTES & PREDICTIONS."
4006 PRINT:PRINT"CHOOSE 1> SAVE
OR 2> LOAD":INPUT SL$
4008 IF SL$="1" THEN 4012
4009 IF SL$="2" THEN 4020
4010 SOUND 1,1:PRINT"CHOOSE 1 OR
 2!":FOR DL=1 TO 460:NEXT:GOTO 4
000
4012 IF CD$="2"THEN 4016
4013 OPEN "O",#-1,"ELECT.DAT"
4014 FOR X=1 TO 51:WRITE #-1,SV(
X),PP(X):NEXT X:CLOSE #-1
4015 RETURN
4016 OPEN "O",1,"ELECT.DAT"
4017 FOR X=1 TO 51:WRITE #1,SV(X
),PP(X):NEXT X:CLOSE 1
4018 RETURN
4020 IF CD$="2" THEN 4026
4021 OPEN "I",#-1,"ELECT.DAT"
4022 FOR X=1 TO 51:INPUT #-1,SV(
X),PP(X):NEXT X:CLOSE #-1
4023 RETURN
4026 OPEN "I",1,"ELECT.DAT"
4027 FOR X=1 TO 51:INPUT #1,SV(X
),PP(X):NEXT X:CLOSE 1
4028 RETURN
4500 CLS:PRINT STRING$(32,175):P
RINT"POLITICAL PREDICTION.....":
PRINT STRING$(32,159);
4502 PRINT"YOUR CHANCE TO OUT-EX
PERT THE   EXPERTS. ENTER YOUR P
REDICTION  AS TO HOW EACH STATE
WILL VOTE.";
4504 PRINT" ELECTION 88 WILL COM
PARE YOUR   PREDICTIONS WITH THE
 ACTUAL VOTEAS IT IS ENTERED.":P
RINT
4506 PRINT"<PRESS ANY KEY TO CON
TINUE>"
4508 AK$=INKEY$:IF AK$=""THEN 45
08 ELSE GOSUB 3070
4509 FOR X=1 TO 51
4510 PRINT@128,"ENTER YOUR PREDI
CTION FOR":PRINT "THE STATE OF "
;LS$(X):PRINT
4512 PRINT"<D>EMOCRAT OR <R>EPUB
LICAN"
4514 PRINT"<X> FOR MENU   ";:INP
UT CH$
4515 IF CH$="X"THEN 4530
4516 IF CH$="D" THEN PP(X)=1:GOT
O 4520
4517 IF CH$="R" THEN PP(X)=2:GOT
O 4520
4518 PP(X)=0
4520 GOSUB 3070:NEXT X
4530 RETURN
```

NOVICES NICHE

We're Looking for a Few Good Shorties

Help! The Niche needs more submissions! If you have written a good shortie, please send it in. We're looking for graphics, utilities, educational programs and games (especially games!). How short is a shortie? Well, if you printed out your listing in 32 columns, as we do, it should fit on one half of an 8½-by-11 inch page (be under 12 inches). (Entering `PRINT#-2,CHR$(27)CHR$(81)CHR$(32)` will allow most Epson-compatible printers to `LLIST` a program in 32 columns if you want to check this.)

Utilities

Free Zone

64K ECB

By Ric Pucella

Scroll Protect is a utility employing a machine language subroutine to protect an area of the screen from scrolling; the area can be affected only by the `PRINT @` command. *Scroll Protect* can be incorporated into another utility or a game, as long as the "parent" program works in the text screen.

When run, the program puts the CoCo in the 64K all-RAM mode (ROM instructions are copied into RAM, where they can be modified). It asks you for the top and bottom line of the "new" screen. These two values (from 0 to 15) will be the new borders of the screen, and anything above or below them lies in the protected zone, unaffected by the scroll. To restore the screen to its original size, press the reset button or run the program again.

The listing: `NOSCROLL`

```
10 '*** SCROLL PROTECT
20 '*** BY RIC PUCELLA
25 CLEAR &HFF,&H7F00
30 DATA 26,80,142,128,0,166,132,
183,255,223,167,128,140,224,0,39
,5,183,255,222,32,239,28,175,57
40 FOR A=3072 TO 3096:READB:POKE
A,B:NEXTA:EXEC3072
50 FORX=&H7F00 TO &H7F1D:READB$:
B=VAL("&H"+B$):POKE X,B:NEXTX
60 DATA BD,B3,E4,83,01,FF,10,22,
35,40,C3,05,FF,34,10,9E,88,BF,7F
,FE,35,10,DD,88,86,63,B7,7F,FD,3
9
70 FORX=&H7FA0 TO &H7FB8:READB$:
B=VAL("&H"+B$):POKE X,B:NEXTX
80 DATA B6,7F,FD,81,63,27,05,86,
0D,7E,B9,B1,BE,7F,FE,9F,88,7F,7F
,FD,86,0D,7E,B9,B1
90 CLS:PRINT"LINES FROM 0 TO 15"
100 PRINT@128,"TOP LINE:";:LINEI
NPUT TP$
110 TP=VAL(TP$)
120 IFTP<0 OR TP>15 THEN 100
130 PRINT@128,"BOTTOM LINE:";:LI
NEINPUT BT$
140 BT=VAL(BT$)
150 IF BT<0 OR BT>15 OR BT<=TP+1
 THEN 130
160 TP=(TP*32+1024)
170 T1=INT(TP/256):T2=TP-(T1*256
)
180 BT=(BT*32+1024)
190 B1=INT(BT/256):B2=BT-(B1*256
)
200 CLS0
210 POKE &HA347,B1
220 POKE &HA348,B2+31
230 POKE &HA34C,T1
240 POKE &HA34D,T2
250 POKE &HA92B,T1
260 POKE &HA92C,T2
270 POKE &HA932,B1
280 POKE &HA933,B2+31
320 PR=BT-TP
340 PR=PR+TP
350 P1=INT(PR/256):P2=PR-(P1*256
)
360 POKE &HA354,P1
370 POKE &HA355,P2
420 POKE &HB903,&H7F
430 POKE &HB904,&H00
431 POKE &HB958,&H7E
432 POKE &HB959,&H7F
433 POKE &HB95A,&HA0
440 CLS
```

I/O in the Fast Lane

64K
DISK

By Joel Hegberg

Thumbing through the June '88 issue of RAINBOW, I came across Scott Honaker's article "Exercise Your Drives" (Page 110). It showed how to really speed up the CoCo's disk drives, but it didn't show how to use that speed for everyday operations. After a careful reading of the article, I loaded *EDTASM+*, started nosing my way through Disk BASIC and found the places that use the disk drives. I made a machine language program and, after days of trial and error, created *FastDisk*.

The program first does a ROM-RAM conversion on the CoCo 1 and 2. Then it stores the ML program into memory and runs it. The program actually changes the drive step rate from a slow 30 milliseconds to a fast six milliseconds. It also reduces the wait period CoCo takes before reading the disk. Every time I use my CoCo 2, I run this program first.

I tested my efforts by timing how long it took to load *EDTASM+* before and after *FastDisk*; it took 12 seconds before and only eight seconds after. *FastDisk* also makes the drive quieter and stops the rattling that worries so many new users.

Just type in, save and run the program. *FastDisk* requires no other programs to help it along, and it should be compatible with most of your BASIC programs. If you press the reset button, however, the system will revert to Disk BASIC. To prevent this, either make a reset patch or simply type `POKE 65503,0` at the OK prompt, to be back in *FastDisk*.

The listing: FASTDISK

```
0 'FAST-DISK
1 '
2 'BY JOEL MATHEW HEGBERG
3 '936 NORTH TWELFTH STREET
4 'DE KALB, ILLINOIS  60115
5 '
6 CLEAR5000:PCLEAR8:CLS:IFPEEK(3
3021)=50THEN7:ELSE10
7 GOSUB12
8 CLS:PRINT"FAST-DISK IS INSTALL
ED."
9 END
10 RESTORE:FORT=4000TO4022:READA
:POKET,A:NEXTT:EXEC4000:GOTO7
11 DATA 26,80,16,142,128,0,127,2
55,222,166,164,127,255,223,167,1
60,16,140,255,0,37,240,57,-4
12 READA:IFA<>-4THEN12:ELSEP=573
44
13 READA:IFA=-1THEN14:ELSEPOKEP,
A:P=P+1:GOTO13
14 EXEC57344:RETURN
15 DATA 126,224,6,126,224,33,142
,224,3,166,128,183,215
16 DATA 101,236,132,253,215,102,
127,215,192,134,205,183
17 DATA 215,224,134,20,183,216,2
2,57,127,9,133,150,234
18 DATA 129,2,38,5,134,41,183,9,
134,126,215,104,0,-1
```

Graphics

Showing Off Random Graphics

CoCo 3

By Allen Goff

Loader and *Ellipse* are two complementary programs that let CoCo 3 users create a series of random graphics and store them for later recall. *Ellipse* allows the user some control over the final appearance of a graphic, and then saves that graphic (in binary format) to disk — it can save as many graphics as the disk will hold (about 20, as each "picture" takes up three granules of disk space).

When run, *Ellipse* prompts the user for the number of designs to save to disk and then calls on random horizontal and vertical values to draw a design of interlocking ellipses across and down the screen. Pressing the up arrow key begins the process anew, overlaying the first design with a different one. The pattern can become as complex as the user wishes. Pressing the right arrow key saves the graphic in its current stage of development. Pressing the space bar clears the screen. The program will continue generating ellipses until it has saved to disk the specified number of graphics.

When you have finished with graphics creation, load *Loader*, insert the "save" disk into the drive, and run. The program will ask you for the number of graphics to display and then proceed to display them in an automatic "slide-show." Although the pictures were drawn in PMODE 4, the program gives you the option of viewing them in PMODE 3.

Listing 1: LOADER

```
10 CLS
20 PRINT"    *******************
***     "
30 PRINT"    *  LOADER PROGRAM
  *     "
40 PRINT"    * PRESS 3 FOR MODE
3 *     "
50 PRINT"    * PRESS 4 FOR MODE
4 *     "
60 PRINT"    *******************
***
70 Z$=INKEY$:IF Z$=""THEN 70 ELS
E IF Z$="3" THEN P=3 ELSE IF Z$=
"4" THEN P=4 ELSE IF Z$<>"3" OR
Z$<>"4"THEN 70
80 INPUT"  ENTER NO.GRAPHICS TO
LOAD";N
90 IF N=0 THEN 80
100 FOR A=1 TO N
110 PMODE P,1:PCLS 1:SCREEN 1,1
120 LOADM(STR$(A))
130 FOR T=1 TO 1000:NEXT T
140 NEXT A
150 PCLS 1
160 RUN
170 END
180 GOTO 180
```

Listing 2: ELLIPSE

```
10 CLS
20 PRINT" **********************
*******"
30 PRINT" *  ELIPSE TO SAVE GRAP
HICS  *"
40 PRINT" * PRESS ANY KEY TO CON
TINUE *"
50 PRINT" **********************
*******"
60 INPUT"  ENTER NO.GRAPHICS TO
SAVE";N
70 IF N=0 THEN 60
80 FOR A=1 TO N
90 WIDTH 32:PALETTE CMP
100 PMODE 4,1
110 PCLS 1
120 SCREEN 1,1
130 R=25
140 C=6
150 I=.25*RND(10)
160 FOR Y=1 TO 191 STEP 27.142
170 FOR X=0 TO 255 STEP 17.00
180 CIRCLE(X,Y),R,C,I,0,.5
190 CIRCLE(X,Y),R,C,I,.5,0
200 NEXT X,Y
210 R=R+1:IF R>50 THEN R=25
220 Z$=INKEY$:IF Z$=""THEN 220 E
LSE IF Z$="^"THEN 240 ELSE IF Z$
=CHR$(9)THEN 250 ELSE IF Z$<>" "
AND Z$<>"^"AND Z$<>CHR$(9)THEN 2
20 ELSE 230
230 PCLS:GOTO 150
240 PMODE 4,1:C=8:GOTO 150
250 SAVEM(STR$(A)),3584,9727,358
4
260 NEXT A
270 GOTO 270
280 END
```

Game

It's a Bug-Eat-Bug World

CoCo 3

By Stephen Elms

In *Centipede* you become a big insect with a voracious appetite for little insects. As the little mites pop up on the screen you use your arrow keys to race over and gulp them up. The only problem is that each bug you eat makes you grow (Mother Centipede always told you that eating your insects would make you grow big and strong). As your body grows longer and longer, it becomes more and more difficult to negotiate the little rectangle in life you've been allotted. Beware of running into your tail or bumping into a wall, for to do so is to court peril! Remember this one commandment and you will live to eat many bugs.

The listing: CENTPEDE

```
5 CLEAR
7 BUG$="S3;U3L2H2F2D3L2R2D3G2E2R
2U3R5L3D3F2H2U6E2"
30 HSCREEN 2
35 HCOLOR 10
40 HPRINT(16,10),"CENTIPEDE"
50 HPRINT(19,12),"BY"
60 HPRINT(14,14),"STEPHEN ELMS"
70 FOR X=1 TO 2500:NEXT
80 DIM EL(800,1)
90 HSCREEN 2
100 HCIRCLE(5,5),3,3
105 HPAINT(5,5),3,3
109 ON ERR GOTO 120
110 HBUFF 1,100
115 HBUFF 2,100
120 HGET(0,0)-(10,10),1
125 HGET(10,10)-(20,20),2
130 HSCREEN 2
140 HCOLOR7:HLINE(10,10)-(310,18
0),PSET,B:HPAINT(5,2),7,7
150 X=130:Y=90:L=1:N=1:C=1:MO=1
160 EL(N,0)=X:EL(N,1)=Y
170 N=N+1:IF N=801 THEN N=1
180 P=HPOINT(X,Y)
190 IF P<>0 AND P<>10 THEN 490
200 IF P=10 THEN XC=1:LL=LL+5:C=
C+10:SOUND45,1
210 GOSUB 380
220 HPUT(X-5,Y-5)-(X+5,Y+5),1,PS
ET
230 IF C=0 THEN HPUT (EL(L,0)-5,
EL(L,1)-5)-(EL(L,0)+5,EL(L,1)+5)
,2,PSET
240 IF C=0 THEN L=L+1
250 IF L=801 THEN L=1
260 IF C>0 THEN C=C-1
270 K$=INKEY$
280 IF K$="" THEN 330
290 IF K$=CHR$(94) THEN MO=1
300 IF K$=CHR$(9) THEN MO=2
310 IF K$=CHR$(10) THEN MO=3
320 IF K$=CHR$(8) THEN MO=4
330 IF MO=1 THEN Y=Y-10
340 IF MO=2 THEN X=X+10
350 IF MO=3 THEN Y=Y+10
360 IF MO=4 THEN X=X-10
370 GOTO 160
380 IF XC>1 THEN XC=XC-1:GOTO 48
0
390 IF XC=1 THEN HDRAW"BM"+X$+",
"+Y$+";C0;"+BUG$
```

```
400 XC=0
410 RR=RND(10)
420 IF RR<>6 THEN 480
430 XX=(RND(25)*10)+30
440 YY=(RND(15)*10)+20
450 IF HPOINT(XX,YY)<>0 THEN 430
460 X$=STR$(XX):Y$=STR$(YY):HDRA
W"BM"+X$+","+Y$+";C10;"+BUG$
470 XC=50
480 RETURN
490 HCOLOR 10
500 HPRINT(16,10),"SCORE "
505 HPRINT(17,12),LL
510 HPRINT(14,14),"PLAY AGAIN"
520 FOR DLAY=1 TO 2000:NEXT
530 K$=INKEY$:IF K$="" THEN 530
540 IF K$="Y" THEN CLS:RUN
550 IF K$="N" THEN END ELSE 530
```

Education

Odd One Out

16K
ECB

By Ken Ostrer

If your children are unsure of, or just a little fuzzy on, which numbers are even and which are odd, *Even-Odd* may be of help. When you run the program, a small tutorial is presented, and then the student is drilled on the subject.

A line of numbers is displayed, and the student must press E or O depending on whether the number is even or odd. A bar at the bottom of the screen represents how much time is left for each set. If time runs out before the responses are complete, the drill will end. Speed and accuracy are of the utmost importance.

Six sets of numbers are presented per screen "page." To make things more interesting, the child must get at least 75 percent of the responses correct in order to advance to the next page. The child will probably get more out of this program if the parent and child solve the problems together.

The listing: EVENODD

```
10 CLEAR500:CLS:PRINT"EVEN ODD T
UTORIAL":PRINT:PRINT"NUMBERS THA
T END IN 0, 2, 4, 6  OR 8 ARE ev
en NUMBERS."
20 PRINT:PRINT"NUMBERS THAT END
IN 1, 3, 5, 7  OR 9 ARE odd NUMB
ERS."
30 PRINT:PRINT"HERE ARE SOME EXA
MPLES OF EVEN  AND ODD NUMBERS:"
:PRINT"EVEN: 2, 4, 10, 102, 206,
 304,  1200, 5498, 12984, 50000,
 183484"
40 PRINT"ODD: 1, 7, 19, 31, 99,
187, 303,1097, 2555, 9999, 20107
, 803345":FORX=1344TO1503:IFPEEK
(X)>90THENPOKEX,PEEK(X)-64ELSEPO
KEX,PEEK(X)-64
50 NEXT:PRINT"PRESS ANY KEY FOR
DRILL SECTION";:K$=INKEY$
60 IFINKEY$=""THEN60
70 CLS:PRINT"EVEN ODD DRILLER":Z
=96:T=0:C=0:N=0:TT=0:X=RND(-TIME
R)
80 PRINT@449,"YOUR SCORE IS:"SC:
PRINT@481,"% RIGHT THIS PAGE:"0;
90 PRINT@19,"P:"PA+1:N=N+1:PRINT
@Z+1,CHR$(96+N);:FORX=1TORND(5)+
5:A$=A$+CHR$(RND(9)+48):NEXTX:PR
INT@Z-27,A$:PRINT@Z+5,STRING$(LE
N(A$),141);:PRINT@417,STRING$(30
,128);
100 K$=INKEY$:IFK$<>"O"ANDK$<>"E
"THENT=T+.1:PRINT@448-T," ";:IFP
EEK(1441)=96THENPLAY"T10O1FGGGGF
FEAGGGG":PRINT@32,"TIME'S UP!";:
FORM=0TO750:NEXTM:GOTO190ELSE100
110 TT=TT+1:PRINT@Z+37+E,K$;
120 P=VAL(MID$(A$,E+1,1))
130 IFP/2=INT(P/2)THENIFK$="E"TH
ENSC=SC+P*10:C=C+1:PLAY"T75O5AEE
EA":GOTO150
140 IFP/2<>INT(P/2)THENIFK$="O"T
HENSC=SC+P*10:C=C+1:PLAY"T75O5AE
EEA"
150 PRINT@448,STRING$(63,32);:PR
INT@449,"YOUR SCORE IS:"SC:PRINT
@481,"% RIGHT THIS PAGE:"C/TT*10
0;
160 E=E+1:IFE<LEN(A$)THEN100
170 T=0:E=0:A$="":Z=Z+128:IFN=6T
HENIFC/TT>=.75THENPLAY"T5O5FBBCC
DCA":PRINT@32,"NEXT PAGE...";:FO
RM=0TO1500:NEXTM:PA=PA+1:GOTO70E
LSEPRINT@32,"SORRY, YOU DIDN'T G
ET 75% RIGHT.";:FORM=0TO1500:NEX
TM:GOTO190ELSEIFN/3=INT(N/3)THEN
Z=112
180 GOTO90
190 PRINT@32,"DO YOU WISH TO TRY
 AGAIN?          ";:K$=INKEY$
200 K$=INKEY$:IFK$="Y"THENRUN70E
LSEIFK$<>"N"THEN200ELSECLS:END
```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

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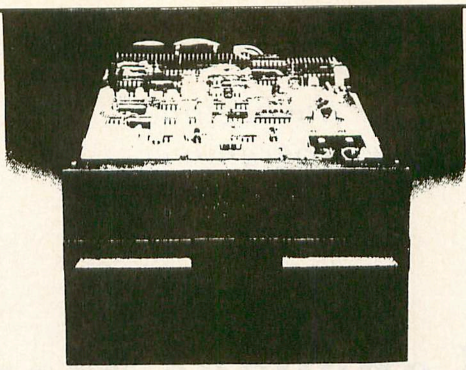

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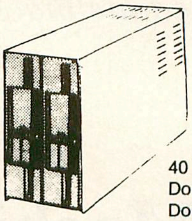

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The fifth in a series of tutorials for the beginner to intermediate machine language programmer

Machine Language Made BASIC
Part V: Get the Point

By William P. Nee

This month's programs change the color of various screen locations. Now, color information is stored in several locations in the Color Computer. Locations used in this article are as follows:

Location		Start-up
$B2	foreground color	(3)
$B3	background color	(0)
$B4	current color	(0)
$B5	$B4x(#$55)	(0)
$C2	PSET = 1; PRESET = 0	

As shown in Figure 1, colors depend on the PMODE and color set used.

Figure 1:

	Number	Set 0	Set 1	$B5
PMODE 3/1	0	green	buff	#$00
	1	yellow	cyan	#$55
	2	blue	magenta	#$AA
	3	red	orange	#$FF
PMODE 4/2/0	0	black	black	#$00
	3	green	buff	#$FF

The computer colors zero to three correspond to the BASIC colors one to four and five to eight. Three is the highest number used for color because 4x(#$55) would be greater than 255 and would not fit into Location $B5. With machine language, we can control and change the contents of the color locations throughout the program.

At start-up, the computer will store 0 in $B3 (for the background color) and 3 in $B2 (for the foreground color). Using the PCLS routine at $9542 will clear the screen to the background color. If you want a different background color, either load the desired color number into $B3 and JSR 9542, or load the desired color number into Register B and JSR $9536. (The latter will *not* change the background color in $B3.)

Location $C2 can be used as a toggle for PSET (if it is set to one) or to PRESET (if it is set to zero). However, the PSET routine we will use starts after the ROM routine has checked Location $C2, so we should use either the subroutine at $959A, which multiplies the color number by #$55 and stores this total at Location $B5, or PMODE 4/2/0, which will store a random 0 or -1 (RND(2)-2) in $B5 and then PSET or PRESET the point. (Remember, -1 is the same number as #$FF.) PMODE 3/1 will use a random (0 - 3)x(#$55) to PSET three colors or PRESET the background color.

You may also use the PPOINT routine at $933C to check the color of a bit at any horizontal location (by storing that bit in Location $BE) and any vertical location (by storing it in $C0). The result of the PPOINT routine is stored in FP1. JSR $B3ED will return the color number to Register B. In PMODE 3/1 the result will be colors one to four (if you are using color set to 0), or colors five to eight (if you are using color set to 1). In PMODE 4/2/0, the result will be zero or one with color set to 0, and zero or five with color set to 1. Your program may have different branches if Register B was equal/not equal to one of these colors. If a point has been PRESET, the PPOINT routine will make it the background color. (Note: You always lose registers A, B, and X, so be sure to save them first.)

The PSET routine is at Address $9374, and, as with most machine language programs, requires some additional setup. The routine uses the following locations:

$B9	bytes per line
$BD/BE	horizontal coordinate — X1
$BF/C0	vertical coordinate — Y1

The coordinate locations are two bytes so that you could, for example, either STX $BD or STA $BE. X1 cannot be greater than 255; Y1 cannot be greater than 191; and neither can be less than zero.

A *scaling* routine at $931D is also required. Since we will pick up the PSET routine after ROM has scaled the coordinates, we must add this to our program prior to the PSET. Scaling adjusts X1 and Y1 to compensate for the different bytes per line (in $B9) assigned to the individual PMODES. Without this scaling routine, most graphic commands (PSET, LINE, CIRCLE, etc.) would be accurate only in PMODE 4. (The PPOINT routine we've already discussed includes the scaling subroutine.)

Bill Nee bucked the "snowbird" trend by retiring to Wisconsin from a banking career in Florida. He spends the long, cold winters writing programs for his CoCo.

Listing 1: `POINTBAS`

```
10 PMODE 4,1:PCLS:SCREEN 1,1
20 FOR N=0 TO 32
30 FOR NN=31 TO N STEP -1
40 B=RND(2)
50 FOR H=0 TO 192 STEP 64
60 FOR V=0 TO 128 STEP 64
70 ON B GOSUB 100,150
80 NEXT V,H,NN,N
90 GOTO 20
100 PSET(H+NN,V+NN-N):PSET(H+NN-
N,V+NN)
110 PSET(H+62-NN,V+NN-N):PSET(H+
62-NN+N,V+NN)
120 PSET(H+62-NN,V+62-NN+N):PSET
(H+62-NN+N,V+62-NN)
130 PSET(H+NN,V+62-NN+N):PSET(H+
NN-N,V+62-NN)
140 RETURN
150 PRESET(H+NN,V+NN-N):PRESET(H
+NN-N,V+NN)
160 PRESET(H+62-NN,V+NN-N):PRESE
T(H+62-NN+N,V+NN)
170 PRESET(H+62-NN,V+62-NN+N):PR
ESET(H+62-NN+N,V+62-NN)
180 PRESET(H+NN,V+62-NN+N):PRESE
T(H+NN-N,V+62-NN)
190 RETURN
```

The `PSET` routine in ROM uses registers A and B, so be sure to save any information in them first. Before running the program, set Location $FF/100 to #$2000. Since the program starts with `PMODE`, type `"GPMODE"` or `"G3000"` to execute it. Pressing any key will break the program, but you must hold the key down for several seconds because the program does a lot before getting to the *break* location. In the 'A' mode you can read the program and symbols from $2200 to $2B65.

Run the BASIC program first to get a feel for the design and program speed (or lack of it). Next, run the machine language program. (Note: The machine language program does *not* run on the CoCo 3.) If you run the machine language program from BASIC, clear enough memory with the command, `CLEAR 200, &H3000-1`. Even though the machine language program is eight times longer, it runs much more quickly.

(Questions or comments concerning this tutorial may be addressed to the author at Route 2, Box 216C, Mason, WI 54856-9302. Please enclose an SASE when requesting a reply.) ☐

Listing 2: `POINTBIN`

```
                    00050 *  $FF/100=#$2000
3000                00100         ORG     $3000
          9374      00110 PSET    EQU     $9374
          00BE      00120 X1      EQU     $BE
          00C0      00130 Y1      EQU     $C0
```

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Shell

OS9: xmode /w5 type=0
OS9: iniz /w5
OS9: rsb <>>>/w5 &
&007
```

CLEAR

```
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DISK EXTENDED COLOR BASIC 2.1
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OK
LOAD "DEMO"
OK
LIST
10 PMODE 4:SCREEN 1,1
20  X=RND(256)-1:Y=RND(192)-1
30  A=RND(256-X)-1:B=RND(192-Y)-1
40 LINE  (X,Y)-(X+A,Y+B),PSET,BF
```

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FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included on the tape or disk using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

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For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material *currently submitted* to another publication.

```
          BF1F      00140 RND      EQU    $BF1F
3000 C6   04        00150 PMODE    LDB    #4
3002 BD   9628      00160          JSR    $9628
3005 C6   01        00170          LDB    #1       PAGE 1
3007 BD   9653      00180          JSR    $9653
300A BD   9542      00190          JSR    $9542    PCLS
300D C6   01        00200          LDB    #1       GRAPHICS SCREEN
300F BD   95AA      00210          JSR    $95AA
3012 C6   01        00220          LDB    #1       COLOR SET 1
3014 BD   9682      00230          JSR    $9682
3017 4F             00240 START    CLRA
3018 B7   3187      00250 LOOP1    STA    N
301B C6   1F        00260          LDB    #31
301D F7   3188      00270 LOOP2    STB    NN
3020 C6   02        00280 RANDOM   LDB    #2
3022 BD   BC7C      00290          JSR    $BC7C    REGISTER B TO FP1
3025 BD   BF1F      00300          JSR    RND      GET RANDOM(2)
3028 BD   B3ED      00310          JSR    $B3ED    FP1 TO REGISTER D
302B 83   0002      00320          SUBD   #2       GET -1 OR 0
302E D7   B5        00330          STB    $B5      -1=#$FF=PSET; 0=PRESET
3030 B6   3188      00340 Q1       LDA    NN       POINT 1
3033 B7   3189      00350          STA    XX
3036 B6   3188      00360          LDA    NN
3039 B0   3187      00370          SUBA   N
303C B7   318A      00380          STA    YY
303F 17   00B0      00390          LBSR   SHOW1
3042 B6   3188      00400 QQ1      LDA    NN       POINT 2
3045 B0   3187      00410          SUBA   N
3048 B7   3189      00420          STA    XX
304B F6   3188      00430          LDB    NN
304E F7   318A      00440          STB    YY
3051 17   009E      00450          LBSR   SHOW1
3054 86   3E        00460 Q2       LDA    #62      POINT 3
3056 B0   3188      00470          SUBA   NN
3059 B7   3189      00480          STA    XX
305C B6   3188      00490          LDA    NN
305F B0   3187      00500          SUBA   N
3062 B7   318A      00510          STA    YY
3065 17   008A      00520          LBSR   SHOW1
3068 86   3E        00530 QQ2      LDA    #62      POINT 4
306A B0   3188      00540          SUBA   NN
306D BB   3187      00550          ADDA   N
3070 B7   3189      00560          STA    XX
3073 F6   3188      00570          LDB    NN
3076 F7   318A      00580          STB    YY
3079 17   0076      00590          LBSR   SHOW1
307C 86   3E        00600 Q3       LDA    #62      POINT 5
307E B0   3188      00610          SUBA   NN
3081 B7   3189      00620          STA    XX
3084 86   3E        00630          LDA    #62
3086 B0   3188      00640          SUBA   NN
3089 BB   3187      00650          ADDA   N
308C B7   318A      00660          STA    YY
308F 17   0060      00670          LBSR   SHOW1
3092 86   3E        00680 QQ3      LDA    #62      POINT 6
3094 B0   3188      00690          SUBA   NN
3097 BB   3187      00700          ADDA   N
309A B7   3189      00710          STA    XX
309D 86   3E        00720          LDA    #62
309F B0   3188      00730          SUBA   NN
30A2 B7   318A      00740          STA    YY
30A5 17   004A      00750          LBSR   SHOW1
30A8 F6   3188      00760 Q4       LDB    NN       POINT 7
30AB F7   3189      00770          STB    XX
30AE 86   3E        00780          LDA    #62
30B0 B0   3188      00790          SUBA   NN
30B3 BB   3187      00800          ADDA   N
30B6 B7   318A      00810          STA    YY
30B9 17   0036      00820          LBSR   SHOW1
30BC B6   3188      00830 QQ4      LDA    NN       POINT 8
30BF B0   3187      00840          SUBA   N
30C2 B7   3189      00850          STA    XX
30C5 86   3E        00860          LDA    #62
30C7 B0   3188      00870          SUBA   NN
30CA B7   318A      00880          STA    YY
30CD 17   0022      00890          LBSR   SHOW1
30D0 F6   3188      00900 FINISH   LDB    NN
```

```
30D3 5A             00910        DECB
30D4 F1   3187      00920        CMPB   N
30D7 102C FF42      00930        LBGE   LOOP2
30DB B6   3187      00940        LDA    N
30DE 4C             00950        INCA
30DF 81   20        00960        CMPA   #32
30E1 1025 FF33      00970        LBLO   LOOP1
30E5 AD   9F A000   00980        JSR    [$A000] ANY INPUT?
30E9 1027 FF2A      00990        LBEQ   START
30ED 5F             01000        CLRB           SET FOR TEXT SCREEN
30EE BD   95AA      01010        JSR    $95AA
30F1 3F             01020        SWI            RTS IF IN BASIC
30F2 FC   3189      01030 SHOW1  LDD    XX      SQUARE 1
30F5 97   BE        01040        STA    X1
30F7 D7   C0        01050        STB    Y1
30F9 BD   9374      01060        JSR    PSET
30FC FC   3189      01070 SHOW2  LDD    XX      SQUARE 2
30FF 8B   40        01080        ADDA   #$40
3101 97   BE        01090        STA    X1
3103 D7   C0        01100        STB    Y1
3105 BD   9374      01110        JSR    PSET
3108 FC   3189      01120 SHOW3  LDD    XX      SQUARE 3
310B 8B   80        01130        ADDA   #$80
310D 97   BE        01140        STA    X1
310F D7   C0        01150        STB    Y1
3111 BD   9374      01160        JSR    PSET
3114 FC   3189      01170 SHOW4  LDD    XX      SQUARE 4
3117 8B   C0        01180        ADDA   #$C0
3119 97   BE        01190        STA    X1
311B D7   C0        01200        STB    Y1
311D BD   9374      01210        JSR    PSET
3120 FC   3189      01220 SHOW5  LDD    XX      SQUARE 5
3123 CB   40        01230        ADDB   #$40
3125 97   BE        01240        STA    X1
3127 D7   C0        01250        STB    Y1
3129 BD   9374      01260        JSR    PSET
312C FC   3189      01270 SHOW6  LDD    XX      SQUARE 6
312F C3   4040      01280        ADDD   #$4040
3132 97   BE        01290        STA    X1
3134 D7   C0        01300        STB    Y1
3136 BD   9374      01310        JSR    PSET
3139 FC   3189      01320 SHOW7  LDD    XX      SQUARE 7
313C C3   8040      01330        ADDD   #$8040
313F 97   BE        01340        STA    X1
3141 D7   C0        01350        STB    Y1
3143 BD   9374      01360        JSR    PSET
3146 FC   3189      01370 SHOW8  LDD    XX      SQUARE 8
3149 C3   C040      01380        ADDD   #$C040
314C 97   BE        01390        STA    X1
314E D7   C0        01400        STB    Y1
3150 BD   9374      01410        JSR    PSET
3153 FC   3189      01420 SHOW9  LDD    XX      SQUARE 9
3156 CB   80        01430        ADDB   #$80
3158 97   BE        01440        STA    X1
315A D7   C0        01450        STB    Y1
315C BD   9374      01460        JSR    PSET
315F FC   3189      01470 SHOW10 LDD    XX      SQUARE 10
3162 C3   4080      01480        ADDD   #$4080
3165 97   BE        01490        STA    X1
3167 D7   C0        01500        STB    Y1
3169 BD   9374      01510        JSR    PSET
316C FC   3189      01520 SHOW11 LDD    XX      SQUARE 11
316F C3   8080      01530        ADDD   #$8080
3172 97   BE        01540        STA    X1
3174 D7   C0        01550        STB    Y1
3176 BD   9374      01560        JSR    PSET
3179 FC   3189      01570 SHOW12 LDD    XX      SQUARE 12
317C C3   C080      01580        ADDD   #$C080
317F 97   BE        01590        STA    X1
3181 D7   C0        01600        STB    Y1
3183 BD   9374      01610        JSR    PSET
3186 39             01620        RTS
3187                01630 N      RMB    1
3188                01640 NN     RMB    1
3189                01650 XX     RMB    1
318A                01660 YY     RMB    1
          3000      01670        END    PMODE
```

Hint . . .

Cursor Controls

Memory location 63372 controls the blink rate of the cursor on the CoCo 3's 40- and 80-column text screens. Simply poke this location with any value from 0 to 255 to change the rate. The default value is 11. Lower values increase the blink rate while larger values make the cursor blink slower. If you want to stop the Hi-Res cursor from blinking altogether, enter `POKE63381,0`. To restart the blinking, enter `POKE 63381,1`.

Ken Ostrer
Vancouver, Washington

Hint . . .

HPRINT Shortened

When entering BASIC programs, I like to use the shorthand version of the `PRINT` command (typing a question mark instead of typing out `PRINT`). Unfortunately, if you try entering `H?` on the CoCo 3 (instead of `HPRINT`), you will get a syntax error upon running the program. To solve this problem, enter the entire listing using `H?`. Then save the listing in ASCII format and reload it. All `H?` commands will be changed to `HPRINT`.

Carl England
Calhoun, Georgia

Hint . . .

BASICally a Setup

In order to make using my CoCo a little easier, I saved a program on my utilities disk that sets the printer baud rate, drive selection and other parameters. To make things even simpler, I named the program `*.BAS`. Now when I want to start working, I just enter `RUN"*` and let the computer set itself up, much in the way an `AUTOEXEC` file works on MS-DOS systems.

Harold Grumann
Atlanta, Georgia

Smooth out those rough spots with a little help from CoCo

What's the Angle?

By Joseph Kolar
Rainbow Contributing Editor

Using the motion option of the CoCo's `DRAW` command, we have created some simple line drawings. Let us now soften the traditionally sharp edges of CoCo graphics by adding gentle curves to our creation.

For this demonstration, we will make a simple footprint — specifically the print of a man's right shoe. We will start with a rough sketch on graph paper. After we get a shape that pleases us, we will use our modified *Graph Paper* program to put the sketch on the CoCo screen.

Begin by choosing the dimensions of the shoe print. (For this demonstration, I chose 8-by-20 units.) Next, take a sheet of graph paper and outline an oblong that is eight boxes wide and 20 boxes long. Use a mark at the top of the oblong to divide the figure into two equal parts. Mark the oblong at two-block intervals along the left vertical line. For our purposes, the upper left-hand corner of this figure will be our point of origin (0,0). The tip of the shoe should be two units wide and centered.

As you sketch, you are also plotting your program line. First, move three units to the right and then make a two-unit pencil mark to the right (`BR3R2`). Move in a 135-degree angle for one unit (`F`). Our sketch widens gradually and should touch the right border of our oblong at the coordinates (8,9). If you draw a line to continue in this direction, you would have a sharp angle two units to the right and three units down, which translates to `M+2,8` or `M+2,+8`.

Next, make your sketch curve toward the center by using a line that moves six units down and two units to the left (`M-2,6`). Now we need to add a heel to this figure. To be in proportion with the rest of the shoe, the heel should be four units long. Because we have five units to fill, start by moving down one unit. Now we will create the front of the heel. In order to be centered, the heel's line should be four units long (`NL4`). Next, move down three units (`D3`), and round the butt of the heel by by moving one unit at a 225-degree angle (`G`) and two units to the left.

(Are you sketching as we go? You should have one half of a shoe on your graph paper.)

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

To make the other side of the heel, move one unit at a 315-degree angle and four units up (`HU4`). We must now show an indentation for the instep. To do this, move in an angle that is four units up and one unit to the right (`M+1,-4`). Now widen the shoe until it touches the left boundary of your oblong by drawing a line that is four units up and three units to the left (`M-3,-4`).

As we return to the tip of the shoe, we must draw a line that moves in a 45-degree angle (`E`) and reaches the top boundary of our oblong at the coordinates (2,1). This will leave a gap that we can connect with a line six units up and two units to the right (`M+2,-6`).

This outline *should* look like a right shoe. Go over the outline in red ink, moving from point to point. Now, let's see what this looks like on the CoCo screen.

Load our *Graph Paper* program (September 1988, Page 80), and add the following line:

```
300 GOTO 300
```

We will need all 19 rows created on the screen and will need to modify the utility in the following manner:

Line 30: change `160` to `190` in both `C$` and `D$` strings.
Line 50: concatenate `+A$+B$+A$`.
Line 60: change `160` to `190` at all four occurrences.
Line 70: change `C4` to `C2`, and change `160` to `190` in both occurrences.

Never hesitate to tailor an existing program to fit a new situation. In this tutorial, we need three more rows, and we want to change the border color to make our outline stand out. In a later, tutorial, we will create a full 256-by-192 screen.

You may want to make the following changes to our graph-paper utility: Add the contents of Line 90 to the end of Line 80, and separate with a colon. Put Line 90 in limbo with a `REM`. Now run the utility. If the program runs properly, delete Line 90.

(While we're modifying our utility, let me offer the solution to the last column's problem: Change all the `1`s to `2`s in lines 150 to 157.)

Back to the drawing board. *We* have a problem. We can only create 19 boxes in a vertical direction, but our shoe is 20 boxes long. How can we create our drawing on the screen? We could shorten the shoe length one unit. Where can we remove one unit on each side of the shoe? I suggest that we begin at Location (6,15) and remove one unit down. Run a zigzag pencil line over the red line one unit above the heel. On the other side of the shoe, make a zigzag line over its mate. These zigzag lines indicate that you must omit the marked segments when you are creating the program line. Now the shoe is 8-by-19 units.

Enter Line 95, which will remove all the unnecessary portions of the graph paper from the screen. This way, you can concentrate on converting your sketch into a shoe on the screen.

Using our shoe print we will begin creating the outline on the CoCo screen by typing the following line:

```
100 DRAW "C3S40BM0,0BR3R2F"
```

Then press ENTER and type `RUN`.

Next, press BREAK and type `EDIT100`. Press ENTER and X to move to the end of the line. Use the left arrow to move one space and remove the closing quote marks in Line 100. Type in `M+2,8M-2,6"`, press ENTER and run. If your screen does not duplicate your sketch, look for an error in either the direction or the number of units. Now press BREAK.

Look at the sketch. We have reached the unit that we plan to omit. Edit Line 100, removing the closing quote as we did before. Now we need to move four units to the left and return to the move's starting point (`NL4`). Next, we need to finish the heel `D3GL2HU3`). To do this, add the following to Line 100:

```
NL4D3GL2HU3"
```

Now press ENTER and run the program.

Complete the shoe by editing Line 100, removing the closing quotes and concluding the `DRAW` statement. Make sure that your statement omits the unit corresponding to the one we removed in our drawing. When you have finished, type `RUN`.

If your footprint is faulty, don't panic. Just refer to your sketch and correct your program line accordingly.

Look over your creation. Would you like to see it in a usable size (like Size 8)? If so, just type in the following lines:

```
98 GOTO 400
400 PMODE4,1:PCLS:SCREEN1,0
410 GOTO 100
```

Edit Line 100 to change `S40` to `S8`. To do this, type `EDIT100`, and press ENTER. Use the space bar to move under the `4`, press D (to delete `4`) and C8 (to change the `0` to an `8`). Now press ENTER to get out of the editing mode, and run the program.

Both sides of the sole come to a sharp point. We want gentler curves than this. Let's make a few modifications to our sketch. (After all, have you ever seen a drawing or a program you couldn't improve?)

First, let's return our shoe print to the graph-paper screen by masking Line 98 with `REM` and editing Line 100 by typing `EDIT100` and pressing ENTER, moving the cursor under `8` and typing `C4I0` to change `8` to `4` and insert `0`. Now press ENTER and run the program.

(You may wish to study the points that are earmarked for modification.)

Begin at (6,0) and sketch a line that moves down six units and right two units, then moves down two more units. This changes `M+2,8` to `M+2,6D2`. With a black pen, mark over the newly created pencil line.

> *"We will make a simple footprint starting with a rough sketch on graph paper, then using our modified* **Graph Paper** *program to put the sketch on the CoCo screen."*

At Point (3,11), we will make a line that moves for three units in a 315-degree angle, and moves up one unit. Pencil it in. That changes `M-3,-4` to `H3U`. Ink over the pencil line in black.

At this time, we have to modify Line 100 to incorporate these changes. If you look at your sketch, you will see that we need to modify the red portions of the sketch to the coordinates indicated by the black lines on the sketch. Note that the first change begins after `F` in Line 100.

Type `EDIT100` and press ENTER. Use the space bar to move the cursor under `8`. Type `C6ID2` to change `8` to `6` and add `D2` to the line. Now press ENTER and run the program.

You must go slowly when editing long `DRAW` statements because it is so easy to make a mistake. Therefore, we will make one set of changes, run the program to see if the outline is changing in the desired manner, and then move to the next change.

The next modification begins after the sequence, `M+1,-4`. Edit Line 100 by typing `EDIT100` and pressing ENTER. Next, type `50`, use the space bar to move the cursor under the `M` of `M-3,-4`, and then type `6DIH3U` to delete the six-character move, `M-3,-4`, replacing it with `H3U`. Then press ENTER and run the program.

This should accentuate the instep a bit more. To see what we have, mask Line 98 and edit Line 100 to change `S40` to `S8`. After you have done this, run the program. Now our shoe print looks like a shoe print.

How would our shoe look with the sole and heel painted? We want to paint the sole in scale eight (`S8`) — the size we plan to use in our next tutorial. Therefore, we must use the `PMODE4,1` screen, (256,192), and determine our paint points by using `PSET`.

To locate a point for the sole, key in `110 PSET(10,10,1)` and run. Now let's locate a point for the heel. Try typing in `120 PSET(34,8,1)` and running the program. It doesn't work. Try reversing the coordinates and running it again. This time it works.

Convert Line 110 to a `PAINT` statement by typing the following:

```
EDIT110
HPAINT(10,10),1,1
```

Run it and then let's check the heel coordinates. Mask Line 110, and then

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edit Line 120 by typing in and running the following:

```
EDIT120
HPAINT(8,34),1,1
```

Finally, unmask Line 110 to see what the painted shoe print looks like.

We have created a shoe print that offers three options for the next tutorial. For practice, get back to the *Big Foot* screen. Mask lines 98,110 and 120, and change `S8` to `S40` in Line 100. Find the correct `PAINT` line coordinates and paint the heel and sole in color C1. We will use Line 101 for this `PAINT` statement. Key in Line 101 without the `REM` marker and run the listing. What if you wanted to use color C2? Try it and see why I chickened out. Your choices are unlimited.

(When you are finished practicing, put the `REM` marker back in Line 101.)

Now all we need to do is make the left shoe print. For practice, you could create the left shoe in the same way that we designed the right one.

There is a better way. Flip over your graph paper drawing of the right shoe. You should be able to see the red and black outlines through the paper. (If not, go over the lines again — this time pressing a little harder.

You may want to trace the two outlines onto the back of the paper in order to see the line more clearly. Be careful as you move from point to point. The top of the sole should be outlined in black. Connect the lower red portion and heel separator. And finally, use red ink to run a zigzag line over the units above the heel that we will omit.

The black outline should indicate the final modifications. In pencil, sketch a line at the top of the shoe that moves left three units. Sketch a similar line up from the leftmost point on the shoe. Your point of origin is where these two pencil points meet, and this is where you will begin your second drawing.

(Save a copy or two of your work at this point.)

There are other ways to proceed with this second print, so mark the point of origin as (0,0) and open up more working space on the graph paper screen by changing `82` to `172` in Line 95. Next, add the following line:

```
96 COLOR 1: LINE(82,0)-
(89,190),PSET,BF
```

We will use Line 105 to create the left shoe print. So begin the line by typing the following:

```
DRAW"C3S40BM90,0
```

Go ahead, Rembrandt, create. Copy from your new sketch. *Don't peek at the listing.* Work it out.

When you have completed your masterpiece, there is one slight problem. The shoes are reversed. How would you swap them? It's easy. Just swap the horizontal locating points in lines 100 and 105.

Now let's check out our shoes in `PMODE4,1` by unmasking Line 98 and changing `S40` to `S8` in lines 100 and 105. Now run the listing.

We must move the right shoe print by changing the location of the vertical coordinate to `20` in Line 100.

Paint the prints any way you like, but compare the two prints when you have painted the soles, when you have painted the heels, and when you have painted both. (Next, you may want to try sketching a pair of women's shoes, 6-by-15 units, using the same procedure we have already used.) You may even want to make a copy of your work.

Now, allow me to give you a few suggestions for creating clearer work in less time. First, sketches and drawings stand out best when done on `SCREEN1,0` of `PMODE4,1`.They are as sharply defined as possible on CoCo's high-resolution, two-color screen. Second, when possible, make the entire design one long, continuous line; try to put locating coordinates only in the program's first `DRAW` statement. This allows much faster execution than when the CoCo is forced to jump from one set of coordinates to another. It also saves on the time it would take to plot those new coordinates. It is easy to pick up a location from a long `DRAW` statement and know exactly where it is in the sequence of movements. Finally, if you must make long jumps to new areas, use the `B DRAW` option. It works well when plotting a picture on graph paper.

That's it for this month. Enjoy your new creative abilities — who knows what is next? With CoCo, the `DRAW` statement and your imagination, the possibilities are endless. ☐

The listing:

```
0 'BIGFOOT
5 CLEAR500
10 PMODE3,1:PCLS:SCREEN1,0
20 A$="D10R240":B$="D10L240"
30 C$="R10D190":D$="R10U190"
40 E$=A$+B$+A$+B$:F$=C$+D$+C$+D$
50 DRAW"C2BM0,0D10R240D10L240D10
R240D10L240"+E$+E$+E$+A$+B$+A$
60 DRAW"BM0,0R10D190R10U190R10D1
90R10U190"+F$+F$+F$+F$+F$
70 DRAW"C2BM0,0R240D190L240U190"
80 'DRAW"C4BM0,40R240D40L240D40R
240D40L240"
90 'DRAW"BM40,0D160R40U160R40D16
0R40U160R40D160"
95 COLOR1:LINE(82,0)-(240,190),P
SET,BF
96 'COLOR1:LINE(82,0)-(89,190),P
SET,BF
98 'GOTO400
100 DRAW"C3S40BM0,0BR3R2FM+2,6D2
M-2,6NL4D3GL2HU3M+1,-4H3UM+2,-6E
"
101 'PAINT(36,36),1,3:PAINT(36,1
82),1,3
105 'DRAW"C3S40BM90,0BR3R2FM+2,6
DG3M+1,4NL4D3GL2HU3M-2,-6U2M+2,-
6E"
110 'PAINT(10,10),1,1
120 'PAINT(8,34),1,1
300 GOTO300
400 PMODE4,1:PCLS:SCREEN1,0
410 GOTO100
```

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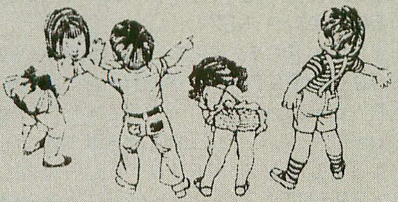

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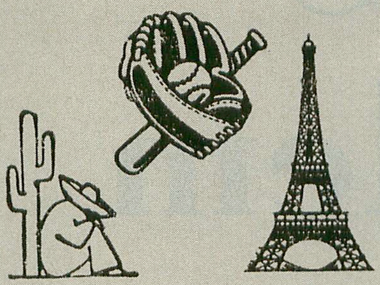

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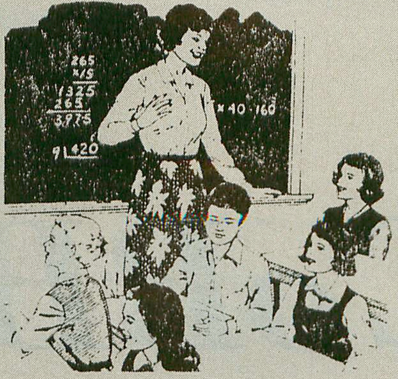

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Use these routines to let your CoBBS system upload and download Xmodem protocol

CoBBS Xmodem Routines

By Robert John Grubb

The *Color BBS System* (*CoBBS*) by Richard Duncan (November 1985, Page 135) is one of the best BBS systems for the Disk BASIC CoCo. However, as the system is written, it has no reliable way of sending and receiving machine language, or packed BASIC programs. To remedy this, I have written two machine language routines that allow *CoBBS* to upload and download using the Xmodem protocol. With these routines, the system can send or receive 100 blocks of data before loading more information or saving the information to disk. At 1200 baud, the system can send or receive one block per second.

Robert Grubb enjoys using his CoCo's for MIDIing his synthesizers, running a BBS, and playing games with his two sons. He enjoys programming in BASIC and machine language. Currently, he is working on an OS-9 Level II BBS system.

Both routines will run on either a CoCo 2 or 3. I have added `REM`s to mark the lines that are specific to each computer. The programs are written for the CoCo 3 using `ON ERR GOTO`. When running the programs on a CoCo 2, change those commands to `RUN T`.

To allow *CoBBS* to run these new routines, a few lines in the main *CoBBS* program must be changed. Delete lines 1200 to 1290 and 20440 to 20950, and add the following lines:

```
1200 POKE&H7E00,B:POKE&H7E01,
TD:POKE&H7E02,ZK:POKE&H7E03,
ZD:FORX=&H0 TO &H3:A$=MID$
(D$,X+1),1):A=ASC(A$):POKE(&H7
E04+X),A:NEXTX
1205 TR$=TR$+"DOWN":GOSUB
9615:PRINT"Loading Download
Protocols.":PRINT"Please
wait . . .":LOAD"XMSEND/SYS",R
1321 CLS:PRINT"1 - ASCII"
:PRINT"2 - Xmodem":PRINT"3
- Press <CR> to exit"
1322 GOSUB600:ON ERRGOTO1300
:X=VAL(CH$):IFX=0THENRETURN
ELSE IF X>0 OR X<3THEN PRINT
TAB(3)CH$ELSE1322
1323 IF X=2 THENPOKE&H7E00,
TD:LOAD"XMRECV/SYS",R
```

Make sure you make these changes to `COBBS.SYS` from a freshly powered-up computer *after* a `PCLEAR1` statement, or you will lose some of the programming when you save it to disk.

Receiving Uploads

`XMRECV.SYS` lets you receive uploads to *CoBBS*. When users first enter into this routine, they are prompted to press ENTER to continue. Line 40 contains a password that you, as SysOp, should choose. Any user who enters the correct password at this time can get a directory listing on all your drives. The user can then upload any file to any disk; and if that user uploads a file already on the disk, *the file is overwritten*.

If the correct password is entered, the screen will prompt `File to U/L:`. The user should then enter an eight-character filename. Next, the prompt `EXT:` will ask for a three-character extension. Finally, the routine asks for the drive number (zero to three). The routine now tells the user to start sending. The host computer's screen clears, and shows the number of blocks received until the upload is finished.

To get a directory listing and granule count, the user types `DIR` (upper or lower case) for the filename and ENTER for the extension. The user then enters the desired drive number. At the end of the listing, the system identifies the number of free grans left on that disk.

If the user does not enter the correct password, the system identifies the number of free grans and asks for a *filename only*. The system takes this name, adds the extension `/XUP` to that filename and puts the file on the drive specified in the data line of the *CoBBS* menu.

When the upload is complete, the system asks the user if another file will be uploaded. If so, then the system reruns the program. `XMRECV.SYS` is a program that asks the user to type `U` to upload [See "*CoBBS*: A Look at the Commands," December '85, Page 153]. `XMRECV.SYS` has the same data types as the ASCII version of *CoBBS* with one exception: While entering the correct password gives users full access to all disks, without this password users may upload only filenames with the extension `/XUP`.

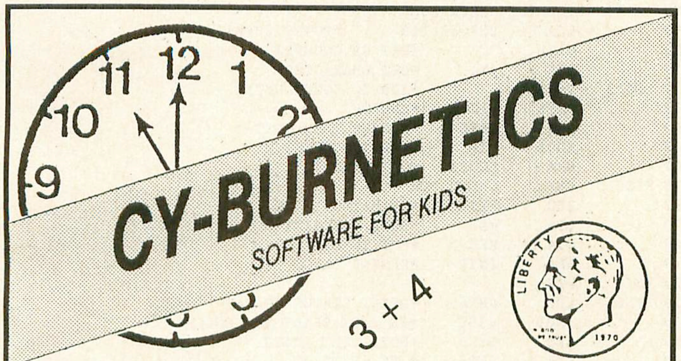
All uploaded programs are saved as ASCII files on the disk. As SysOp, you can change the filenames to names that can be downloaded without problem. If you want to run the programs on your CoCo, convert them to the proper type (i.e., `.BIN`, or `.BAS`) before you can run them. In the listings you will find a public domain file, `FCONV.BAS`, that will convert files for you. The file includes instructions.

`XMRECV.ASM` is the source code to the machine language routine used by `XMRECV.SYS`. I assembled it on the Radio Shack Disk *EDTASM+* assembler. Type it in and assemble it to the *CoBBS* system disk as `XMRECV.BIN`.

Those of you who do not have an assembler can type in the BASIC pro-

Listing 1: `XMRECV.ASM`

```
                     00005          TITLE   XMRECV/BIN (C) 1986 JOHN GRUBB
                     00010 ****************************************
                     00020 * XMRECV/BIN FOR THE CoBBS XMRECV/SYS *
                     00030 * XMODEM TRANSFERS. COPYRIGHT 1986 (C)*
                     00040 *             JOHN GRUBB              *
                     00050 *            RT 4 BOX 309             *
                     00060 *          GALLIPOLIS, OHIO           *
                     00070 *                 45631               *
                     00080 *        PHONE (614)-446-7430         *
                     00090 ****************************************
                     00100 * YOU MAY USE THIS PROGRAM WITHOUT    *
                     00110 * CHARGE AS LONG AS ALL CREDITS       *
                     00120 * REMAIN INTACT.                      *
                     00130 ****************************************
                     00140 * YOU MUST USE THIS PROGRAM WITH THE  *
                     00150 * BASIC PROGRAM "XMRECV/SYS" AS THE   *
                     00160 * PROGRAMS EXPECT DATA FROM EACH      *
                     00170 * OTHER. THESE PROGRAMS ARE EASILY    *
                     00180 * MODIFIED FOR YOUR PERSONAL USE...   *
                     00190 ****************************************
7E00                 00200          ORG     $7E00
                     00210 *********V 1.01*************
```



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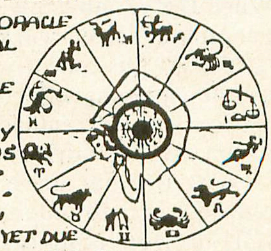

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gram, `XMRECPK.BAS`. This file will poke the values into upper RAM and save it to your disk. I have included checksums so that any mistakes may be identified by the line number.

Sending Files

`XMSEND.SYS` lets you send programs via Xmodem. This file uses the same kinds of menus as the ASCII version. In this manner, the system remains virtually the same as it was originally set up by Richard Duncan. Therefore, you do not have to relearn how to set up downloads for your system.

On your *CoBBS* menu, press D to download. The data specification is `0COCO`. The buffer number is 0, which means that the user's buffer is not opened and closed automatically. If the buffer number is 1 instead, the buffer opens, the directory is listed and the buffer is then closed. `COCO` is a four-character filename, in front of which the system adds `DOWN`, and at the end of which it adds `/MNU`. Therefore, the system searches all drives to locate a menu called `DOWNCOCO/MNU`.

The buffer numbers 3 and 4 change the data to `BDPxxx`, where B identifies the download type; D identifies the drive from which to download; and P allows no downloads of files with the extensions `/SYS`, `/BIN` or `/BAK`. When the buffer number is 3, the user can download only from the drive specified. When it is 4, the user has full access to all drives. The buffer numbers 3 and 4 allow the user to type `DIR` to get a directory on any drive.

When the variable `B` is either 3 or 4, the computer screen will prompt `File to D/L:`. At this time, the user should enter the eight-character filename and extension to be downloaded. The system then asks for a drive number. If the file exists on that drive, the user is prompted for download type (i.e., ASCII/buffer control, ASCII/no buffer control, or Xmodem). If Xmodem is selected, the system does a block count and asks if the user wants to continue. (The system offers several places to abort in case users change their minds.) The system then goes to Receive mode and begins sending the program. If Variable `B` is either 0 or 1, the system displays the menu and then asks for the number to download. Once the system makes sure the file exists, it performs in the same manner as when 3 or 4 is the buffer code.

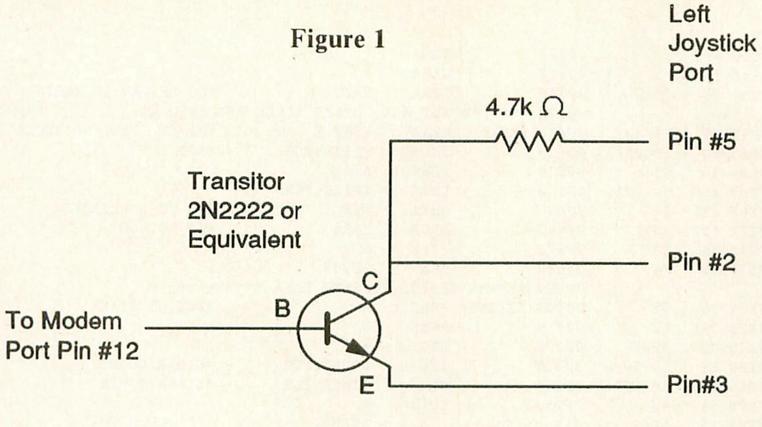
The ASCII transfers are the same as in the original *CoBBS* system.

Because the system takes the number

```
7E00           00220 BUFFER  RMB     128
7E80           00230 COUNT   RMB     1
7E81           00240 BLKIN   RMB     1
7E82           00250 RECOM   RMB     1
7E83           00260 CHKSU   RMB     1
7E84 86   00   00270 INIT    LDA     #$0
7E86 5F        00280         CLRB
7E87 6F   8C F6  00290       CLR     COUNT,PCR
7E8A 30   8D FF72 00300      LEAX    BUFFER,PCR
7E8E A7   80   00310 LOOP1   STA     ,X+     *CLEAR OUT THE BUFFER
7E90 5C        00320         INCB
7E91 C1   80   00330         CMPB    #128    *END OF BUFFER?
7E93 26   F9   00340         BNE     LOOP1   *NOPE? GO FINISH
               00350 *******START RECEIVE******
7E95 86   15   00360 REC     LDA     #21     *SEND ORIGINAL NAK
7E97 17   006B 00370         LBSR    SEND    *GO SEND IT
7E9A 86   00   00380         LDA     #0
7E9C A7   8D 00A8 00390      STA     TIMER,PCR       *RESET TIMER
7EA0 CE   0000 00400 TRIP    LDU     #0      SET TIMER TO 0
7EA3 17   007C 00410         LBSR    RECEV
7EA6 81   01   00420         CMPA    #1      *IS IT START OF BLOCK?
7EA8 27   19   00430         BEQ     BLOCK   *YES? GO GET REST
7EAA B7   7FFE 00440         STA     $7FFE   *SAVE IT
7EAD 81   18   00450         CMPA    #24     *ABORT??
7EAF 27   53   00460         BEQ     EXIT    *THEN QUIT
7EB1 81   04   00470         CMPA    #4      *END OF FILE?
7EB3 27   4F   00480         BEQ     EXIT    *THEN QUIT
7EB5 6C   8D 008F 00490      INC     TIMER,PCR       *INCREASE TIMER
7EB9 A6   8D 008B 00500      LDA     TIMER,PCR
7EBD 81   FF   00510         CMPA    #$FF    *IS IT 255?
7EBF 26   DF   00520         BNE     TRIP    *NO? GO ADD MORE TO TIMER
7EC1 20   D2   00530         BRA     REC
               00540 *************GET BLOCK*********************************
7EC3 17   004A 00550 BLOCK   LBSR    RECEV1
7EC6 A7   8C B8  00560       STA     BLKIN,PCR       *BLOCK #
7EC9 17   0044 00570         LBSR    RECEV1
7ECC A7   8C B3  00580       STA     RECOM,PCR       COMPLEMENT
7ECF 30   8D FF2D 00590      LEAX    BUFFER,PCR      *BUFF ADDRESS
7ED3 17   003A 00600 LOOP2   LBSR    RECEV1  *GET CHARACTER
7ED6 A7   80   00610         STA     ,X+     *PUT IN BUFFER
7ED8 6C   8C A5  00620       INC     COUNT,PCR       *KEEP TRACK
7EDB A6   8C A2  00630       LDA     COUNT,PCR       *TILL END
7EDE 81   80   00640         CMPA    #128    *OF BUFFER
7EE0 26   F1   00650         BNE     LOOP2   *GET NEXT CHARACTER
7EE2 17   002B 00660 CKSUM   LBSR    RECEV1  *GO GET CHECK
7EE5 A7   8C 9B  00670       STA     CHKSU,PCR       *SUM
               00680 **********COMPUT CHECK SUM**********************
7EE8 30   8D FF14 00690      LEAX    BUFFER,PCR      *POINT BUFFER
7EEC 5F        00700         CLRB            *SET UP COUNTER
7EED A6   80   00710         LDA     ,X+     *GET CHARACTER
7EEF 5C        00720 LOOP3   INCB            *ADD TO COUNT UNTIL
7EF0 C1   80   00730         CMPB    #128    *END OF
7EF2 27   04   00740         BEQ     RESEND  *BUFFER THEN QUIT
7EF4 AB   80   00750         ADDA    ,X+     *ADD TO CHECKSUM
7EF6 20   F7   00760         BRA     LOOP3   *GET NEXT
7EF8 A1   8C 88  00770 RESEND CMPA   CHKSU,PCR
7EFB 27   07   00780         BEQ     EXIT    *ON MATCH LEAVE
7EFD 86   15   00790         LDA     #21     *SEND NAK NEXT
7EFF B7   7E96 00800         STA     REC+1   *PUT IN PGM
7F02 20   80   00810         BRA     INIT    *RESEND BLOCK
7F04 39        00820 EXIT    RTS
7F05 F6   FF69 00830 SEND    LDB     $FF69   *CHECK STATUS OF PAK
7F08 C4   10   00840         ANDB    #$10    *IS PACK READY TO SEND?
7F0A 27   F9   00850         BEQ     SEND    *NOPE, TRY AGAIN
7F0C B7   FF68 00860         STA     $FF68   *YES, SEND IT.
7F0F 39        00870         RTS
7F10 B6   FF69 00880 RECEV1  LDA     $FF69   *CHECK STATUS OF PAK
7F13 84   20   00890         ANDA    #$20    *CARRIER??
7F15 26   28   00900         BNE     NOC     *NOPE? GO TELL BASIC AND EXIT
7F17 B6   FF69 00910         LDA     $FF69   *SEE IF PACK HAS A CHR?
7F1A 84   08   00920         ANDA    #$8
7F1C 27   F2   00930         BEQ     RECEV1  *NOPE, TRY AGAIN
7F1E B6   FF68 00940         LDA     $FF68   *YES, GET IT
7F21 39        00950         RTS
7F22 B6   FF69 00960 RECEV   LDA     $FF69   *CHECK STATUS OF PAK
7F25 84   08   00970         ANDA    #$08
7F27 27   04   00980         BEQ     CARIER  *NOPE? GO CHECK CARRIER
7F29 B6   FF68 00990         LDA     $FF68   *LOAD IT
7F2C 39        01000         RTS
7F2D B6   FF69 01010 CARIER  LDA     $FF69   *CHECK STATUS OF PAK
7F30 84   20   01020         ANDA    #$20    *CHECK CARRIER
7F32 26   0B   01030         BNE     NOC     *NOPE? GO TELL BASIC AND EXIT
7F34 86   00   01040         LDA     #0
7F36 33   41   01050 JUNK    LEAU    +1,U
7F38 1183 0050 01060         CMPU    #$50    *END OF BUFFER?
7F3C 26   E4   01070         BNE     RECEV   *NO? GET SOME MORE
7F3E 39        01080         RTS
7F3F 86   18   01090 NOC     LDA     #24     * LOAD REGISTER THEN
7F41 B7   7FFE 01100         STA     $7FFE   *SEND IT TO BASIC PROGRAM
7F44 20   BE   01110         BRA     EXIT
7F46 32   7E   01120         LEAS    -2,S
7F48           01130 TIMER   RMB     1
          0000 01140         END

00000 TOTAL ERRORS
```

Figure 1



Joystick modification for 1200 baud modem detection. Modem must support Pin 12 high speed indication.

Listing 2: `XMSEND.ASM`

```
                  00005         TITLE   XMSEND/BIN (C) 1986 John Grubb
                  00010 ****************************************
                  00020 * XMSEND/BIN FOR THE CoBBS XMSEND/SYS *
                  00030 * XMODEM TRANSFERS. COPYRIGHT 1986 (C)*
                  00040 *              JOHN GRUBB             *
                  00050 *             RT 4, BOX 309           *
                  00060 *            GALLIPOLIS, OHIO         *
                  00070 *                  45631              *
                  00080 *          PHONE:(614)-446-7430       *
                  00090 ****************************************
                  00100 * YOU MAY USE THIS PROGRAM WITHOUT    *
                  00110 * CHARGE AS LONG AS ALL CREDITS       *
                  00120 * REMAIN INTACT.                      *
                  00130 ****************************************
                  00131 * YOU MUST USE THIS PROGRAM WITH THE  *
                  00132 * BASIC PROGRAM "XMSEND/SYS" AS THE   *
                  00133 * PROGRAMS EXPECT DATA FROM EACH      *
                  00134 * OTHER. THESE PROGRAMS ARE EASILY    *
                  00135 * MODIFIED FOR YOUR PERSONAL USE...   *
                  00136 ****************************************
7E00              00140         ORG     $7E00
                  00150 ******* GET INFO FROM BASIC ********
7E00 10EF 8D 011B 00160         STS     STACK,PCR       *STORE STACK POINTERS
7E05 BD   B3ED    00170         JSR     $B3ED           *GET PARAMETERS FROM BASIC
7E08 1F   02      00180         TFR     D,Y             *MOVE TO Y
7E0A E6   A4      00190         LDB     ,Y              *LENGTH OF STRING
7E0C AE   22      00200         LDX     2,Y             *GET STRING LOCATION
7E0E C1   80      00210         CMPB    #$80            *128 BYTES?
7E10 1026 00EB    00220         LBNE    ERR1            *NO? THEN GO REPORT
7E14 5F           00230         CLRB
7E15 6F   8D 0103 00240         CLR     TRIES,PCR       *CLEAR RETRIES
                  00250 *********** SETUP FOR BLOCK HEADER DATA *******
7E19 86   01      00260 SETUP   LDA     #$1             *<SOH>
7E1B 8D   5C      00270         BSR     SETSND          *SEND IT
7E1D A6   8D 00FA 00280         LDA     BLOCK,PCR       *GET BLOCK NUMBER
7E21 8D   56      00290         BSR     SETSND          *SEND IT
7E23 88   FF      00300         EORA    #$FF            *COMPLIMENT OF BLOCK NUMBER
7E25 8D   52      00310         BSR     SETSND          *SEND IT
7E27 5F           00320         CLRB
7E28 CE   0000    00330         LDU     #$0             *LOAD U TO
7E2B EF   8D 00EA 00340         STU     CHKSU,PCR       *CLEAR CHEKSUM
                  00350 ******* SEND THE BLOCK ****************
7E2F A6   80      00360 SNDBLK  LDA     ,X+             *LOAD STRING BYTE
7E31 8D   46      00370         BSR     SETSND          *SEND IT
7E33 34   04      00380         PSHS    B
7E35 34   02      00390         PSHS    A
7E37 4F           00400         CLRA
7E38 34   02      00410         PSHS    A
7E3A EC   8D 00DB 00420         LDD     CHKSU,PCR       *GET CHECKSUM
7E3E E3   E1      00430         ADDD    ,S++            *ADD BYTE TO IT
7E40 ED   8D 00D5 00440         STD     CHKSU,PCR       *NOW SAVE IT
7E44 35   04      00450         PULS    B
7E46 5C           00460         INCB
7E47 C1   80      00470         CMPB    #$80            *IS IT 128 BYTES?
7E49 27   02      00480         BEQ     ENDBLK          *THEN GO SEND CHECKSUM
7E4B 20   E2      00490         BRA     SNDBLK          *GO SEND REST OF BLOCK
                  00500 ******* SEND THE CHECKSUM ***************
7E4D A6   8D 00C9 00510 ENDBLK  LDA     SUM,PCR         *GET LAST 8 BYTES OF CHECKSUM
7E51 8D   26      00520         BSR     SETSND          *AND SEND IT
7E53 8D   69      00530         BSR     SETREC          *GO WAIT FOR ANSWER
7E55 81   06      00540         CMPA    #$6             *IS IT <ACK>?
7E57 26   09      00550         BNE     RESND           *NO? SEND LAST BLOCK AGAIN
7E59 6F   8D 00BF 00560         CLR     TRIES,PCR       *CLEAR TRIES, AND GO FOR NEXT BLO
```

entered by the user and adds `COCO` to the front and `/DOW` to the end of that number, you will need to make a text file called `DOWNCOCO/MNU` that lists a number, program name and a description of that program. If a user enters 1 for download, the system looks on all drives for a file named `COCO1/DOW`. If the system locates that filename, it asks for the type of download (ASCII or XModem). From that point, the system prompts the user throughout the procedure.

`XMSEND.ASM` is the source code to the program `XMSEND.BIN`, which is used by `XMSEND.SYS`. Assemble it to your system disk as `XMSEND.BIN`. As with the other source code program, if you don't have an assembler, type in the program `XMSNDPK.BAS`. It will poke the routine in high RAM and then save it to disk.

1200-Baud Modification

In this article, I have included a schematic (Figure 1) describing the use of a transistor in determining the baud rate of a modem with a High Speed Indication Line (Pin 12 on the modem). This information is read by *CoBBS* through the left joystick port, and the entire circuit will fit inside the joystick plug. Cut Line 12 in the DB25 cable, which connects the modem to the RS-232 pack, and send it to the circuit. Next, change Line 40 in the `USER.SYS` program to read as follows:

```
40 CLS:EXEC&H10DA:POKE4657,0
:GOSUB10035
```

Add the following lines:

```
10035 IF JOYSTK(0)<30 THEN
POKE 65387,56:PRINT"CONNECTED
AT 1200 BAUD":FOR X=1 TO 900:
NEXTX:RETURN
10036 POKE65387,54:PRINT"
CONNECTED AT 300
BAUD":FORX=1TO900:NEXTX:RETURN
10037 GOTO10035
```

You may have to play with the value returned by `JOYSTK(0)` to find the best value for your modem.

Enjoy these programs. If there are any problems, I can be reached on Delphi (username GRUBBY), or call my BBS at (614) 446-7430. I am online Friday through Sunday, from 6 p.m to 11:30 p.m., at 300/1200 baud 8-bit, 1 stop bit, no parity.

(Questions or comments about the programs may also be directed to the author at Route 4, Box 309, Gallipolis, OH 45631. Please enclose an SASE when requesting a reply.) ☐

Hint . . .

What's in Memory?

Until you type the `DOS` command, the computer's memory is mostly concerned with Color Computer BASIC. Once the `DOS` command calls the OS-9 operating system into action, the computer memory locations take in all sorts of procedures. When you use the `mdir` (module directory) command, a screen display of all modules now in memory appears.

Some of the modules listed on your screen are identical to those you will find in the `CMDS` (commands) directory of your OS-9 system disk. For instance, such often-used commands as `del` (delete), `list` and `load` are in memory and also available on the disk in the `CMDS` directory. But an infrequently used command like `backup` is found only on the disk.

Other modules listed to the screen when you use the `mdir` command are not on your disk. Most such modules are not usually commands, and thus not executable. Most of them relate to OS-9 system functions.

You can load commands into memory using the `load` command. For instance, if you type `load backup`, then the `backup` command enters memory as a module along with the other 50 or more modules. It stays there until you type `unlink backup`.

When you use the `backup` command without first loading it into memory, it is automatically loaded into memory, does its backup work, and then is automatically *unlinked* to remove itself from memory. If these things are done automatically, then why ever load `backup` into memory?

When you buy an OS-9-driven commercial program (say, a game), the `backup` command is not likely to be on the disk. You could then load `backup` into memory from your system disk, replace it with your new game disk, and then call for a backup, running it from memory. You should unlink `backup` once the job is finished.

Del Turner, Kamloops, BC

```
CK
7E5D 4F             00570         CLRA
7E5E 5F             00580         CLRB
7E5F 16   00A0      00590         LBRA   EXIT            *GO RETURN TO BASIC
                    00600 ******* NOT ACK, RESET BLOCK AND SEND IT
7E62 30   88 80     00610 RESND   LEAX   -$80,X          *RESET START OF BLOCK
7E65 6C   8D 00B3   00620         INC    TRIES,PCR       *ADD 1 TO TRIES
7E69 34   02        00630         PSHS   A
7E6B A6   8D 00AD   00640         LDA    TRIES,PCR
7E6F 81   06        00650         CMPA   #$6             *IS IT 6 RETRIES?
7E71 102C 009F      00660         LBGE   ERR4            *IF SO, GO
7E75 35   02        00670         PULS   A
7E77 20   A0        00680         BRA    SETUP
                    00690 ****** SET UP TO SEND DATA *************
7E79 34   02        00700 SETSND  PSHS   A               *PUT ON STACK
7E7B 34   40        00710         PSHS   U
7E7D CE   0000      00720         LDU    #$0
7E80 EF   8D 009A   00730         STU    COUNT,PCR       *CLEAR COUNTER
7E84 6F   8D 0095   00740         CLR    TIMER,PCR       *CLEAR TIMER
7E88 35   40        00750         PULS   U
7E8A B6   FF69      00760 SEND    LDA    $FF69
7E8D 84   10        00770         ANDA   #$10            *IS PAK READY?
7E8F 27   06        00780         BEQ    CONT1           *NOPE
7E91 35   02        00790         PULS   A               *PULL FROM STACK
7E93 B7   FF68      00800         STA    $FF68           *AND SEND IT
7E96 39             00810         RTS
                    00820 ******* TIME OUT ROUTINE FOR SENDING BLOCK
7E97 34   10        00830 CONT1   PSHS   X
7E99 AE   8D 0081   00840         LDX    COUNT,PCR       *LOAD COUNTER
7E9D 30   01        00850         LEAX   1,X             *ADD 1 TO IT
7E9F AF   8D 007B   00860         STX    COUNT,PCR       *SAVE IT
7EA3 27   04        00870         BEQ    TIMER1          *IF OVER 255 THEN ADD TO TIMER
7EA5 35   10        00880         PULS   X
7EA7 20   E1        00890         BRA    SEND
7EA9 34   04        00900 TIMER1  PSHS   B
7EAB E6   8D 006E   00910         LDB    TIMER,PCR       *LOAD TIMER
7EAF 5C             00920         INCB                   *ADD 1 TO IT
7EB0 C1   03        00930         CMPB   #$3             *3 TIME OUTS?
7EB2 27   56        00940         BEQ    ERR2            *GO REPORT IT
7EB4 E7   8D 0065   00950         STB    TIMER,PCR       *SAVE IT
7EB8 35   04        00960         PULS   B
7EBA 35   10        00970         PULS   X
7EBC 20   CC        00980         BRA    SEND
                    00990 ******* SET UP TO RECV A BYTE *****
7EBE 34   40        01000 SETREC  PSHS   U
7EC0 CE   0000      01010         LDU    #$0
7EC3 EF   8D 0057   01020         STU    COUNT,PCR       *CLEAR COUNTER
7EC7 6F   8D 0052   01030         CLR    TIMER,PCR       *CLEAR TIMER
7ECB 35   40        01040         PULS   U
7ECD B6   FF69      01050 RECV    LDA    $FF69
7ED0 84   08        01060         ANDA   #$8             *ANYTHING IN PAK?
7ED2 27   04        01070         BEQ    CONT2           *NO, ADD TO TIMER
7ED4 B6   FF68      01080         LDA    $FF68           *LOAD IT
7ED7 39             01090         RTS
                    01100 ******* TIME OUT ROUTINE FOR RECEIVEING ACK
7ED8 34   10        01110 CONT2   PSHS   X
7EDA AE   8D 0040   01120         LDX    COUNT,PCR       *LOAD COUNTER
7EDE 30   01        01130         LEAX   1,X             *ADD 1 TO IT
7EE0 AF   8D 003A   01140         STX    COUNT,PCR       *SAVE IT
7EE4 27   04        01150         BEQ    TIMER2          *OVER 255, THEN ADD TO TIMER
7EE6 35   10        01160         PULS   X
7EE8 20   E3        01170         BRA    RECV
7EEA 34   04        01180 TIMER2  PSHS   B
7EEC E6   8D 002D   01190         LDB    TIMER,PCR       *LOAD TIMER
7EF0 5C             01200         INCB                   *ADD 1 TO IT
7EF1 C1   15        01210         CMPB   #$15            *IS IT OVER $15?
7EF3 2C   1A        01220         BGE    ERR3            *GO REPORT IT
7EF5 E7   8D 0024   01230         STB    TIMER,PCR       *ELSE SAVE IT
7EF9 35   04        01240         PULS   B
7EFB 35   10        01250         PULS   X
7EFD 20   CE        01260         BRA    RECV
                    01270 ******* SET UP FOR ERROR REPORTS
7EFF 4F             01280 ERR1    CLRA
7F00 C6   01        01290         LDB    #$1             *STRING ERROR
                    01300 **** NEXT STATEMENT SENDS DATA BACK TO BASIC'S VARPTR
7F02 10EE 8D 0019   01310 EXIT    LDS    STACK,PCR       *RESTORE POINTERS
7F07 7E   B4F4      01320         JMP    $B4F4           *PUT PARAM BACK TO BASIC
7F0A CC   0002      01330 ERR2    LDD    #$2             *COMMUNICATIONS FAILURE
7F0D 20   F3        01340         BRA    EXIT
7F0F CC   0003      01350 ERR3    LDD    #$3             *XMODEM TIME OUT
7F12 20   EE        01360         BRA    EXIT
7F14 CC   0004      01370 ERR4    LDD    #$4             *6 RETRIES ATTEMPTED
7F17 20   E9        01380         BRA    EXIT
                    01390 ******* PROGRAM VARIABLES ****************
7F19                01400 CHKSU   RMB    1
7F1A                01410 SUM     RMB    1
7F1B                01420 BLOCK   RMB    1               *POKED IN BY BASIC PROGRAM
7F1C                01430 TRIES   RMB    1
7F1D                01440 TIMER   RMB    1
7F1E                01450 COUNT   RMB    2
7F20                01460 STACK   RMB    2
          0000      01470         END

00000 TOTAL ERRORS
```

105 72
210 192
450 89
END 217

Listing 3: XMRECV.SYS

```
0 'XMRECV.SYS V2.1
1 'COPYRIGHT 1986 BY JOHN GRUBB
2 'PROGRAM TO ALLOW UPLOADS TO T
HE
3 'COBBS BBS SYSTEM
4 'MUST USE XMRECV/BIN WITH THIS
 PROGRAM
10 ON ERR GOTO 440
15 FS=PEEK(&H7E00)
20 CLEAR 15000,&H7BFE:EC=0:PRINT
CHR$(12):'CHANGE CLEAR TO CLEAR
1500,&H7000 FOR COCO II VERSION
25 DIM RC$(100)
30 PRINT"CoBBS Xmodem Uploader V
2.1":PRINT"By John Grubb":PRINT"
Copyright 1986":PRINT:PRINT:PRIN
T"Please press RETURN to continu
e...";:PRINTCHR$(7)
40 PW$="PASSWORD"
50 LINEINPUTP$:IF P$<>PW$ THEN G
OTO 140
60 FT$="":EX$="":D$=""
70 LINEINPUT"File to U/L: ";FT$:
IFLEN(FT$)>8THENPRINTCHR$(7):GOT
O70
80 LINEINPUT"        EXT: ";EX$:
IFLEN(EX$)>3THENPRINTCHR$(7):GOT
O80
90 LINEINPUT"    DRIVE #: ";D$:D
=VAL(D$):IF D<0 OR D>3 THENPRINT
CHR$(7):GOTO90
100 IF LEFT$(FT$,3)="DIR" OR LEF
T$(FT$,3)="dir" THEN110ELSEIFFT$
=""THEN440
105 F$=FT$+"/"+EX$+":"+D$:GOTO21
0
110 IF D=1 THEN DIR1:GOTO130ELSE
IFD=2 THEN DIR2:GOTO130
120 IF D=0 THEN DIR0ELSEDIR3
130 PRINT"Free Grans: ";:PRINTFR
EE(D):GOTO60
140 ON ERR GOTO600:PRINT"Checkin
g free disk space. Please wait..
."
150 X=FREE(FS):IF X<5 THENPRINT"
Sorry, Disk is FULL!...":PRINTCH
R$(7):GOTO440
160 PRINT X;" Grans Free"
170 ON ERR GOTO 600
180 PRINT"Filename (8 Chars or l
ess). Do not use ";CHR$(34);"/";
CHR$(34);")":PRINT"Enter nothing
 to ABORT"
190 LINEINPUT"FILENAME >>";F$:IF
 F$="" THEN PRINT"Aborted":GOTO4
40
195 IF INSTR(F$,"/")>0 THEN 600
ELSE IFINSTR(F$,".")>0 THEN 600
200 F$=F$+"/XUP:"+RIGHT$(STR$(FS
),1):ON ERR GOTO210:OPEN"I",#1,F
$:CLOSE:PRINT"I have that....":G
OTO140
210 ON ERR GOTO 440:A$=" ":POKEV
ARPTR(A$),&H80:POKEVARPTR(A$)+2,
&H7E:POKEVARPTR(A$)+3,0
220 POKE&H7FFE,0:POKE&H7E96,21
230 CLS
240 OPEN"O",#1,F$:BL=0:ON ERR GO
TO 420
250 PT=PEEK(&HFF22)AND1:IFPT=1TH
EN260ELSEPRINT#-2,"Uploaded ";F$
260 LOADM"XMRECV/BIN":POKE&H7E96
,21
270 PRINT"Begin file transmissio
n.":PRINT"On MIKEY TERM press <D
OWNARROW> <3>."
280 CLS2:FORX=1TO8000:NEXTX:GOSU
B875
290 RD=0:T=0
300 GOSUB 540
310 FORX=1TO2000:NEXTX
320 EXEC&H7E84
330 A=PEEK(&H7FFE)
340 IF A=24 OR A=13 THEN 380
350 IF A=4 THEN 490
360 GOSUB 450
370 POKE &H7E96,6:GOTO 320
380 GOSUB 570
390 IF BL=0 THEN 410
400 FOR X=1 TO BL:PRINT#1,RC$(X)
;:NEXT X
410 CLOSE#1:CLEAR 200,&H7FFE:GOS
UB885
420 FOR X=1 TO 5:PRINTCHR$(7);:N
EXT X
430 GOSUB700:LINEINPUT"Upload an
other (Y/N)";Q$:IF LEFT$(Q$,1)="
Y" OR LEFT$(Q$,1)="y" THENGOTO 3
0
440 CLEAR 200,&H7FFF:PRINT"Loadi
ng Main System... Please wait...
":CLOSE:UNLOAD:RUN"COBBS.STM"
450 A$=" ":POKEVARPTR(A$),&H80:P
OKEVARPTR(A$)+2,&H7E:POKEVARPTR(
A$)+3,0
460 BL=BL+1:RC$(BL)=A$:POKE 1024
,BL AND 255
461 LOCATE10,10:PRINT"Blocks Rec
eived ";BL;:'USE THIS FOR COCO I
II
462 REM PRINT @33,"BLOCKS RECEIV
ED ";BL;:'USE THIS FOR COCO II
470 IF BL<100 THEN RETURN
480 FOR X=1 TO 100:PRINT#1,RC$(X
);:NEXT X:BL=0:RETURN
490 '
```

```
500 T=0
510 E=PEEK(&HFF69):F=E AND 16
520 IF F THEN POKE&HFF68,6:GOTO
380
530 T=T+1:IF T<1000 THEN 510 ELS
E PRINT"PAK NOT READY!":GOSUB570
:GOTO440
540 POKE&HFF6A,PEEK(&HFF6A) AND
&H9F
550 POKE&HFF6B,PEEK(&HFF6B) AND
&H9F
560 RETURN
570 POKE&HFF6A,PEEK(&HFF6A) OR &
H60
580 POKE&HFF6B,PEEK(&HFF6B) OR &
H20
590 RETURN
600 EC=EC+1:IF EC=5 THEN440ELSE1
80
700 IFPEEK(4658)=0THEN710ELSE CD
=PEEK(65385):CD=CD AND 32:IF CD<
>0 OR PEEK(4657)<>0 THEN440ELSE7
10
710 RETURN
875 POKE&H0168,PEEK(4681):POKE&H
0169,PEEK(4682):RETURN
885 POKE&H0168,&H10:POKE&H0169,&
HE6:RETURN
```

Listing 4: XMRECPK.BAS

```
0 'XMRECPK.BAS V2.1
1 'COPYRIGHT 1986 BY JOHN GRUBB
2 'THIS ROUTINE POKES THE
3 'MACHINE CODE FOR THE
4 'XMRECV/BIN ROUTINE
10 DATA 134, 0, 95, 111, 140, 2
46, 48, 141, 255, 114, 167, 128,
 92, 193, 128, 38, 249, 134, 21,
 23, 0, 107, 134, 0, 167, 2865
20 DATA  141, 0, 168, 206, 0, 0,
 23, 0, 124, 129, 1, 39, 25, 183
, 127, 254, 129, 24, 39, 83, 129
, 4, 39, 79, 108, 2054
30 DATA  141, 0, 143, 166, 141,
0, 139, 129, 255, 38, 223, 32, 2
10, 23, 0, 74, 167, 140, 184, 23
, 0, 68, 167, 140, 179, 2782
40 DATA  48, 141, 255, 45, 23, 0
, 58, 167, 128, 108, 140, 165, 1
66, 140, 162, 129, 128, 38, 241,
 23, 0, 43, 167, 140, 155, 2810
50 DATA  48, 141, 255, 20, 95, 1
66, 128, 92, 193, 128, 39, 4, 17
1, 128, 32, 247, 161, 140, 136,
39, 7, 134, 21, 183, 126, 2834
60 DATA  150, 32, 128, 57, 246,
255, 105, 196, 16, 39, 249, 183,
 255, 104, 57, 182, 255, 105, 13
2, 32, 38, 40, 182, 255, 105, 33
98
70 DATA  132, 8, 39, 242, 182, 2
55, 104, 57, 182, 255, 105, 132,
 8, 39, 4, 182, 255, 104, 57, 18
2, 255, 105, 132, 32, 38, 3086
80 DATA  11, 134, 0, 51, 65, 17,
 131, 0, 255, 38, 228, 57, 134,
24, 183, 127, 254, 32, 190, 50,
126, 0, 2107
140 CLS:PRINT@200,"NOW POKING CO
DE"
150 CLEAR20,&H7BFE:ST=&H7E84:C=0
160 FOR Y=1 TO 7
170 FOR X=1 TO 25
180 GOSUB 400
190 NEXT X
200 GOSUB 500
210 NEXT Y
220 Y=8:FOR X=1 TO 22
230 GOSUB 400
240 NEXT X
250 GOSUB 500
260 CLS
270 PRINT"INSERT DISK TO RECEIVE
 FILE IN"
280 INPUT"DRIVE 0 AND PRESS ENTE
R";A$
290 SAVEM"XMRECV/BIN",&H7E84,&H7
F48,&H7E00
300 PRINT"FILE HAS NOW BEEN SAVE
D"
310 END
320 STOP
400 READ N:POKE ST,N
410 C=C+N:ST=ST+1
420 PRINT @0,N
430 RETURN
500 READ N
510 IF N<>C THEN PRINT "ERROR IN
 LINE #";(Y*10):STOP
520 C=0:RETURN
```

✓					
30	128	1250	250	1530	166
112	165	1320	102	9210	123
610	236	1380	108	9620	148
1005	233	1460	67	END	131
1217	119				

Listing 5: XMSEND.SYS

```
0 'XMSEND.SYS V2.1
1 'COPYRIGHT 1986 BY JOHN GRUBB
2 'PROGRAM TO ALLOW XMODEM DOWNL
OADS
3 'FROM THE COBBS BBS SYSTEM.
4 'MUST USE XMSEND/BIN WITH THIS
 PROGRAM.
5 ON ERR GOTO 30
10 CLEAR15000,&H7DFF
11 DIM BC$(21),L$(80),TY$(21),TX
$(21),D$(21),B$(100),KY$(21):NU$
=CHR$(0):DR$(0)="0":DR$(1)="1":D
```

```
R$(2)="2":DR$(3)="3"
12 DEFUSR0=&H0ED0:DEFUSR1=&H0ED3
:DEFUSR2=&H0E81:DEFUSR3=&H7E00:O
N ERR GOTO30:GOSUB9500:GOSUB25:G
OTO900
25 '
26 IFPEEK(4658)=0THEN28 ELSE CD=
PEEK(65385):CD=CD AND 32:IF CD <
>0 OR PEEK(4657)<>0 THEN 27 ELSE
 28
27 CLOSE:POKE65387,54:POKE65386,
107:FORT=1TO100:NEXTT:TR$=TR$+"L
OC":GOSUB9615:CLEAR200,&H7FFF:LO
AD"USER.STM",R
28 II$=INKEY$:IFII$=""THEN29ELSE
CH$=II$:K=INSTR("^_ ]",II$):IFK=
0THEN29ELSE ON K GOSUB 800,31,71
30,9800
29 RETURN
30 PRINT:PRINT"Unable to ACCESS.
 Returning to Main System..":GOT
O10000
31 RETURN
100 '
101 DC=VAL(HEX$(PEEK(&H0EFD))):H
R=VAL(HEX$(PEEK(&H0EFE))):MN=VAL
(HEX$(PEEK(&H0EFF))):SS=VAL(HEX$
(PEEK(&H0F00))):HR$=RIGHT$(STR$(
HR),2):IFHR<10THEN MID$(HR$,1,1)
="0"
104 MN$=RIGHT$(STR$(MN),2):IFMN<
10THEN MID$(MN$,1,1)="0"
105 TI$=HR$+":"+MN$:IF SS<54ORMN
>58THEN108
106 MN=MN+1:IFMN>59 THENMN=0:HR=
HR+1:IF HR>23 THENHR=0
107 X=USR1(HR*256+MN)
108 X=PEEK(4611):IFX<>DC THEN111
109 DA$=RIGHT$(STR$(PEEK(4608)),
2)+"/"+RIGHT$(STR$(PEEK(4609)),2
)+"/"+RIGHT$(STR$(PEEK(4610)),2)
110 GOTO118
111 MM=PEEK(4608):DA=PEEK(4609):
YY=PEEK(4610):DA=DA+1:IFDA>31THE
NDA=1:MM=MM+1:IF MM>12 THEN MM=1
:YY=YY+1
112 POKE4608,MM:POKE4609,DA:POKE
4610,YY:POKE4611,DC:GOTO109
118 AX=PEEK(4615)*60+PEEK(4616):
PT=HR*60+MN:IFF3=1THEN124ELSEUO=
PEEK(4619):IFPT-AX<(UO*5)-5 OR U
O=255 THEN121
119 T0=PEEK(4619)*5:T1=T0-(PT-AX
):IFT1<1THEN T1=0:GOTO120 ELSE P
RINT"You only have";T1;"Minutes
left!":GOTO121
120 PRINT"No time left!":TR$=TR$
+"TIMED OUT "+TI$:GOSUB9615:GOTO
9820
```

```
121 '
124 RETURN
150 '
152 F=ASC(F$):E=128:F$=""
154 FOR Q=1 TO 8
156 J=INT(F/E)
158 IF J=0 THEN F$=F$+"0"ELSEF$=
F$+"1"
160 F=F-(E*J):E=E/2
162 NEXT Q
166 RETURN
600 '
603 TIMER=0
604 GOSUB25:ON ERR GOTO 1170
605 EXEC&H10DA:CH$=CHR$(PEEK(448
1)):IC$=INKEY$:IFIC$<>""THEN CH$
=IC$:GOTO615
609 IF TIMER>4000THEN PRINT:PRIN
T:PRINT"You timed out!!":TR$=TR$
+"KTO":GOSUB9615:GOTO9820
610 IFCH$=CHR$(0)THEN604
615 RETURN
655 GOSUB25:ON ERR GOTO 1170:LIN
EINPUTCH$:GOSUB25:RETURN
675 GOSUB655:G1$="":IFCH$=""THEN
RETURN
680 FOR G=1 TO LEN(CH$)
685 G1=ASC(MID$(CH$,G,1)):IFG1>9
6ANDG1<123THEN G1=G1-32
690 G1$=G1$+CHR$(G1):NEXTG:CH$=G
1$:RETURN
800 RETURN
850 '
855 POKE&H016B,197:POKE&H016C,PE
EK(4684):RETURN
875 POKE&H0168,PEEK(4681):POKE&H
0169,PEEK(4682):RETURN
885 POKE&H0168,&H10:POKE&H0169,&
HE6:RETURN
900 B=PEEK(&H7E00):TD=PEEK(&H7E0
1):ZK=PEEK(&H7E02):ZD=PEEK(&H7E0
3)
905 D$="":A$="":FORX=&H0 TO &H3:
D=PEEK(&H7E04+X):A$=CHR$(D):D$=D
$+A$:NEXT X
1000 '
1005 GOSUB25:ON ERR GOTO 1175
1010 '
1015 '
1020 GOTO1200
1170 '
1175 PRINT"System Error!, Wait..
.";:PRINTCHR$(7);
1180 ER=PEEK(&HFD):EL=PEEK(&HFE)
*&H100+PEEK(&HFF)
1181 IF ER=>54 THEN EA=&HC242+ER
:GOTO1185
1182 IF ER=>50 THEN EA=&H88D9+ER
:GOTO1185
```

```
1183 EA=&HABAF+ER
1185 ER$=CHR$(13)+"***ERROR TYPE
 "+CHR$(PEEK(EA))+CHR$(PEEK(EA+1
))+" IN LINE"+STR$(EL)+"***":PRI
NTER$:GOTO1200
1200 ON ERR GOTO 1229:GOSUB885:P
RINTCHR$(7):IFTD>2THENPRINT:PRIN
T"File to D/L: ";:GOTO1215
1206 IF D9=0 THEN D9=1:CH$="M":G
OTO1225
1210 PRINT:GOSUB100:PRINT"[M]enu
,<CR> to Exit or":PRINT"# to Dow
nload: ";:FT$="":F$=""
1215 GOSUB675:ONERR GOTO1229:IFC
H$=""THEN D9=0:GOTO10000ELSEFT$=
CH$:IFTD<3THENIFLEN(CH$)>4THEN12
00ELSE1220
1216 IFLEFT$(CH$,3)<>"DIR"THENF$
=CH$:GOTO1226ELSE D=VAL(RIGHT$(C
H$,1)):IF TD<4 THEN D=ZD
1217 IFD=1THEN DIR1:GOTO1219ELSE
IFD=2THENDIR2:GOTO1219
1218 IF D=0THEN DIR0 ELSE DIR3
1219 PRINT"Free: ";FREE(D):GOTO1
200
1220 GOSUB25:IFCH$<>"M"THEN1230
1225 FT$="DOWN"+D$+"/MNU:":D=-1:
GOSUB1245:GOTO1210
1226 IFTD=3THEN D=ZD ELSEPRINT"D
RIVE: ";:GOSUB600:ON ERR GOTO120
0:D=VAL(CH$):IFD>3THEN1226ELSEPR
INTD
1227 IFZK>0 THEN X$=RIGHT$(F$,4)
:IFX$="/SYS"ORX$="/BIN"THEN1200
1228 F$=F$+":"+DR$(D):ONERR GOTO
1290:GOTO1230
1229 GOTO1175
1230 CLS:PRINT"1 - ASCII, No Buf
fer":PRINT"2 - ASCII, With Buffe
r":PRINT"3 - Xmodem D/L":PRINT"P
ress <CR> to exit"
1235 GOSUB600:ONERR GOTO1200:X=V
AL(CH$):B=X-1:IFX=0THENRETURNELS
EIFX>0ORX<4THENPRINTTAB(3)CH$ELS
E1235
1237 IFTD>3THEN1255
1240 FT$=D$+FT$+"/DOW:":D=-1
1245 ON ERR GOTO1245
1250 IFTD=3THEN1290ELSED=D+1:IFD
>3THEN1290ELSE F$=FT$+DR$(D)
1255 CLOSE:UNLOAD:ONERR GOTO1250
:OPEN"I",#1,F$:ONERR GOTO1290:PR
INTCHR$(12):CLS:IFCH$="M"THEN127
0
1257 IFX=3THEN 1300
1260 IF B=0 THENPRINT"Open Buffe
r.....":PRINTCHR$(7):FOR O =1 TO
 1500:NEXTO
1265 IF B=1 THENPRINTCHR$(18);
1270 IFEOF(1)THEN1275ELSEGOSUB25
:LINEINPUT#1,A$:PRINTA$:EXEC4314
:CH=PEEK(4481):IFCH=83ORCH=115OR
INKEY$="S"THEN1275ELSE1270
1275 ONERRGOTO1200:IFCH$="M" THE
N 1280ELSEIF B=1 THENPRINTCHR$(2
0)ELSEFORO=1TO1500:NEXTO
1280 CLOSE:TR$=TR$+CHR$(13)+"DOW
: "+F$+CHR$(13):GOSUB9610:GOTO12
00
1290 ON ERR GOTO1200:PRINTCHR$(7
);:PRINT"Unable to access.":PRIN
T:GOTO1200
1300 LOADM"XMSEND/BIN":ON ERR GO
TO 1625
1310 CLS:PRINTCHR$(12):PRINT"CoB
BS Xmodem Downloader V2.1":PRINT
"By John Grubb":PRINT"Copyright
1986"
1315 PRINT:PRINT"1. Continue wit
h Download"
1320 PRINT"2. Return to CoBBS"
1325 PRINT"Comand>>";
1330 GOSUB600
1335 IF CH$<"1"ORCH$>"2"THEN1330
ELSEPRINTCH$
1340 IF CH$="2" THEN CLOSE:UNLOA
D:GOTO10000
1345 ON ERR GOTO 1200
1350 CLOSE:OPEN"D",#1,F$,128:FIE
LD#1,128 AS R$:PF=0:RD=0:BL=0:BC
=0
1355 PRINT"Loading program for b
lock count.."
1360 GOSUB1540:PRINT TB;"Blocks
to send."
1365 PRINT:PRINT"Continue with d
ownload? (Y/N)";
1370 ON ERR GOTO 1175: GOSUB600:
IFCH$=""THEN1370ELSEIFCH$="Y"OR
CH$="y"THEN PRINT"YES!":GOTO1375
 ELSE PRINT"NO":CLOSE:GOTO1200
1375 ONERRGOTO1625:PRINTCHR$(12)
:PRINT"Ready to transmit.":PRINT
"On MIKEY TERM press":PRINT" <DO
WNARROW><4>.":PRINT"Begin XMODEM
 TRANSMISSION":GOSUB25:GOSUB1605
:GOSUB1415:IF RD THEN GOSUB1440:
PRINT"<NAK> not recived!":GOTO13
10 ELSE1385
1380 GOSUB1540
1385 GOSUB875:CLS2:FOR BV=1TOBL
1386 LOCATE10,10:PRINT"Blocks le
ft to send";(TB-BC);:'FOR COCO I
II USE THIS
1387 REM PRINT@33,"BLOCKS LEFT T
O SEND";(TB-BC);:'FOR COCO II US
E THIS
1388 GOSUB 1445
1390 POKE 1024,BC:LPOKE&H60000,B
C:NEXTBV:'FOR COCO II, DELETE TH
E LPOKE STATEMENT.
1395 BL=0:IFLB=0 THEN1380
1400 GOSUB1485
1405 GOSUB1440
```

```
1410 CLOSE:UNLOAD:GOSUB885:FORX=
1TO5:PRINTCHR$(7);:NEXT X:GOTO12
00
1415 GOSUB25:X=0:RD=0
1420 E=PEEK(65385):F=E AND 8
1425 IF F=0 THEN 1435
1430 IF PEEK(65384)<>21 THEN1435
 ELSERETURN
1435 X=X+1:IF X<1000 THEN 1420
1440 POKE&HFF6B,PEEK(&HFF6B)OR&H
20:POKE&HFF6A,PEEK(&HFF6A) OR &H
60:RD=1:RETURN
1445 GOSUB25:BC=BC+1:POKE&H7F1B,
BC
1450 A=USR3(VARPTR(B$(BV)))
1455 IF A=1 THEN TR$=TR$+"XMODEM
 STRING ERROR":GOSUB9615:GOSUB16
20:GOTO1410
1460 IF A=2 THEN TR$=TR$+"COMMUN
ICATIONS FAILURE! - MODEM OR RS2
32 PAK":GOSUB9615:GOSUB1620:GOTO
1410
1465 IF A=3 THEN TR$=TR$+"XMODEM
 TIME OUT.":GOSUB9615:GOSUB1620:
GOTO1410
1470 IF A=4 THEN TR$=TR$+"DOWNLO
AD - 6 RETRIES ATTEMPTED":GOSUB9
615:GOSUB1620:GOTO1410
1475 IF A<>0 THEN TR$=TR$+"FATAL
 ERROR":GOSUB9615:GOSUB1620:GOTO
1200
1480 RETURN
1485 D=4:GOSUB1495:T=0
1490 GOSUB1525:T=T+1:IF D=6 THEN
GOTO1440ELSEIFT<200 THEN 1490ELS
E1440
1495 T=0
1500 E=PEEK(65385)
1505 E=E AND 16
1510 IF E THEN POKE 65384,D:RETU
RN ELSET=T+1
1515 IF T<1000 THEN 1500
1520 GOTO 1440
1525 E=PEEK(65385):F=E AND 8
1530 IF F THEN D=PEEK(65384): EL
SE D=0
1535 RETURN
1540 TB=LOF(1)+1:LB=0
1545 PF=PF+1
1550 IF PF>LOF(1) THEN 1575
1555 BL=BL+1:GET#1,PF
1560 B$(BL)=R$
1565 IF BL=100 THEN RETURN
1570 GOTO1545
1575 MF=(PF-1)*128:LB=1
1580 CLOSE:OPEN"D",#1,F$,1:FIELD
#1,1 AS R$
1585 BL=BL+1:B$(BL)=""
1590 MF=MF+1:IF MF<=LOF(1) THEN
GET#1,MF:B$(BL)=B$(BL)+R$:GOTO15
90
1595 IF LEN(B$(BL))<128 THENB$(B
L)=B$(BL)+" ":GOTO1595
1600 CLOSE:RETURN
1605 POKE&HFF6B,PEEK(&HFF6B) AND
 &H9F:POKE&HFF6A,PEEK(&HFF6A) AN
D &H9F
1610 RETURN
1620 GOSUB1440:PRINT"XMODEM ERRO
R":RETURN
1625 GOSUB1440:GOTO1200
7130 RETURN
9200 '
9205 F$="USERL.SYS:"+DR$(PEEK(46
72))
9210 OPEN"D",#1,F$,96
9215 FIELD#1,50 AS UN$,8 AS UP$,
1 AS UR$,1 AS UA$,1 AS U1$,1 AS
U2$,1 AS UU$,1 AS UE$,5 AS U5$,5
 AS UM$,5 AS UD$,1 AS U3$,1 AS U
4$,1 AS UO$,1 AS UL$,4 AS US$,9
AS SP$
9220 K1=LOF(1):RETURN
9500 '
9510 GOSUB9200:GET#1,1
9520 K=INSTR(UN$,CHR$(0)):NA$=LE
FT$(UN$,K-1):PR=ASC(UA$):F$=U1$:
GOSUB150:P1$=F$:F$=U2$:GOSUB150:
P2$=F$:UL=ASC(UL$):IF UL<1 OR UL
>4 THENUL=1
9550 BC=ASC(UE$):LM=CVN(UM$):POK
E4619,ASC(UO$):POKE4628,UL:POKE4
618,BC:POKE4620,PR:POKE4621,ASC(
U1$):POKE4622,ASC(U2$):CLOSE:RET
URN
9610 IFLEN(TR$)<64THENRETURN
9615 FR=PEEK(4669):ONERR GOTO 96
70:IFFR=0THEN9635ELSEIFFR=1THEN9
640ELSEIFFR=3THEN9660ELSECLOSE:F
$="TRACER.SYS:"+DR$(PEEK(4675)):
OPEN"D",#1,F$,128
9616 FR=FREE(PEEK(4675)):IFFR<3T
HENCLOSE:RETURN
9620 FIELD#1,128 AS X$:K1=LOF(1)
:K1=K1+1:LSET X$=TR$+CHR$(0):PUT
#1,K1
9635 CLOSE:TR$="":RETURN
9640 OPEN"O",-1,"TRACER/SYS":PRI
NT#-1,TR$:GOTO9635
9660 PT=PEEK(&HFF22)AND1:IFPT=1T
HEN9635ELSEPRINT#-2,TR$:GOTO9635
9670 POKE4669,0:GOTO1000
9820 CLS:PRINT:PRINT"Thanks for
calling":PRINT"The Gallipolis Co
BBS..."
9825 PRINT:CLEAR200,&H7FFF
9830 POKE4615,HR:POKE4616,MN:POK
E4617,SS
9840 PRINT"Please hang up now.":
POKE65386,106:LOAD"USER.STM",R
10000 CLEAR200,&H7FFF:PRINTCHR$(
12):PRINT:PRINT:PRINT:PRINT"Load
ing Main System... Please Wait":
LOAD"COBBS.STM",R
```

Listing 6: XMSNDPK.BAS

```
0 'XMSNDPK.BAS V2.1
1 'COPYRIGHT 1986 BY JOHN GRUBB
2 'THIS ROUTINE POKES THE
3 'MACHINE CODE FOR THE
4 'XMSEND/BIN ROUTINE.
10 DATA  16, 239, 141, 1, 27, 18
9, 179, 237, 31, 2, 230, 164, 17
4, 34, 193, 128, 16, 38, 0, 235,
 95, 111, 141, 1, 3, 2625
20 DATA  134, 1, 141, 92, 166, 1
41, 0, 250, 141, 86, 136, 255, 1
41, 82, 95, 206, 0, 0, 239, 141,
 0, 234, 166, 128, 141, 3116
30 DATA  70, 52, 4, 52, 2, 79, 5
2, 2, 236, 141, 0, 219, 227, 225
, 237, 141, 0, 213, 53, 4, 92, 1
93, 128, 39, 2, 2463
40 DATA  32, 226, 166, 141, 0, 2
01, 141, 38, 141, 105, 129, 6, 3
8, 9, 111, 141, 0, 191, 79, 95,
22, 0, 160, 48, 136, 2356
50 DATA  128, 108, 141, 0, 179,
52, 2, 166, 141, 0, 173, 129, 6,
 16, 44, 0, 159, 53, 2, 32, 160,
 52, 2, 52, 64, 1861
60 DATA  206, 0, 0, 239, 141, 0,
 154, 111, 141, 0, 149, 53, 64,
182, 255, 105, 132, 16, 39, 6, 5
3, 2, 183, 255, 104, 2590
70 DATA  57, 52, 16, 174, 141, 0
, 129, 48, 1, 175, 141, 0, 123,
39, 4, 53, 16, 32, 225, 52, 4, 2
30, 141, 0, 110, 1963
80 DATA  92, 193, 3, 39, 86, 231
, 141, 0, 101, 53, 4, 53, 16, 32
, 204, 52, 64, 206, 0, 0, 239, 1
41, 0, 87, 111, 2148
90 DATA  141, 0, 82, 53, 64, 182
, 255, 105, 132, 8, 39, 4, 182,
255, 104, 57, 52, 16, 174, 141,
0, 64, 48, 1, 175, 2334
100 DATA  141, 0, 58, 39, 4, 53,
 16, 32, 227, 52, 4, 230, 141, 0
, 45, 92, 193, 21, 44, 26, 231,
141, 0, 36, 53, 1879
110 DATA  4, 53, 16, 32, 206, 79
, 198, 1, 16, 238, 141, 0, 25, 1
26, 180, 244, 204, 0, 2, 32, 243
, 204, 0, 3, 32, 2279
120 DATA  238, 204, 0, 4, 32, 23
3, 0, 0, 0, 0, 0, 0, 0, 0, 711
130 CLS:PRINT @200,"NOW POKING C
ODE"
140 CLEAR20,&H7DFF:ST=&H7E00:C=0
150 FOR Y=1 TO 11
160 FOR X=1 TO 25
170 GOSUB 400
180 NEXT X
190 GOSUB 500
200 NEXT Y
210 Y=12:FOR X=1 TO 14
220 GOSUB 400
230 NEXT X
240 GOSUB 500
250 CLS
260 PRINT"INSERT DISK TO RECEIVE
 FILE IN"
270 INPUT"DRIVE 0 AND PRESS ENTE
R";A$
280 SAVEM "XMSEND/BIN",&H7E00,&H
7F20,&H7E00
290 PRINT"FILE HAS NOW BEEN SAVE
D"
300 END
310 STOP
400 READ N:POKE ST,N
410 C=C+N:ST=ST+1
420 PRINT @0,N
430 RETURN
500 READ N
510 IF N<>C THEN PRINT "ERROR IN
 LINE #";(Y*10):STOP
520 C=0:RETURN
```

Listing 7: FCONV.BAS

```
10 CLEAR 1000
20 CLS:PRINT"CHANGE DISK FILETYP
E"
30 PRINT"INSTRUCTIONS? (Y/N) ";:
LINEINPUT Z$:IF Z$="Y" THEN GOSU
B 460
40 LINEINPUT"FILENAME :";F1$
50 LINEINPUT"      EXT :";F2$
60 LINEINPUT"      DRV :";DRV$:X=
VAL(DRV$)
70 IF F1$="" AND F2$="" AND DRV$
="" THEN 450
80 IF F1$="" THEN DIR X:GOTO40
90 FORZ=3 TO 11
100 DSKI$X,17,Z,A$,B$
110 A$=A$+LEFT$(B$,127)
120 FORK=0 TO 7
130 PT=K*32
140 NA$=MID$(A$,PT+1,13)
150 IF LEFT$(NA$,1)=CHR$(0) THEN
```

```
 200
160 IF LEFT$(NA$,1)=CHR$(&HFF) T
HEN PRINT"FILE NOT FOUND!":GOTO4
0
170 EXT$=MID$(NA$,9,3)
180 X$=RIGHT$(NA$,2):B1=ASC(LEFT
$(X$,1)):B2=ASC(RIGHT$(X$,1))
190 IF F1$=LEFT$(NA$,LEN(F1$)) A
ND F2$=EXT$ THEN GOTO220
200 NEXTK
210 NEXTZ
220 CLS:PRINTCHR$(12):PRINT:PRIN
TLEFT$(NA$,11)
230 PRINT"THIS IS A ";
240 IF B1=1 AND B2=255 THEN PRIN
T"ASCII DATA FILE"
250 IF B1=0 AND B2=0 THEN PRINT"
BINARY BASIC FILE"
260 IF B1=0 AND B2=255 THEN PRIN
T"ASCII BASIC FILE"
270 IF B1=2 AND B2=0 THEN PRINT"
MACHINE LANG. FILE"
280 PRINT:PRINT"CONVERT THIS TO.
.."
290 PRINT"1. ASCII DATA"
300 PRINT"2. BINARY BASIC"
310 PRINT"3. ASCII BASIC"
320 PRINT"4. MACHINE LANG."
330 PRINT:LINEINPUT">";Z$
340 IF Z$<"1" OR Z$>"4" THEN 280
350 IF Z$="1" THEN X$=CHR$(1)+CH
R$(&HFF)
360 IF Z$="2" THEN X$=CHR$(0)+CH
R$(0)
370 IF Z$="3" THEN X$=CHR$(0)+CH
R$(&HFF)
380 IF Z$="4" THEN X$=CHR$(2)+CH
R$(0)
390 LINEINPUT"SURE? (Y/N)";Z$:IF
 Z$<>"Y" THEN 450
400 N1$=LEFT$(NA$,11)+X$
410 MID$(A$,PT+1,13)=N1$
420 C$=LEFT$(A$,128):D$=RIGHT$(A
$,127)+CHR$(0)
430 DSKO$X,17,Z,C$,D$
440 GOTO 40
450 PRINT"1. EXIT TO DOS":PRINT"
2. RESTART":LINEINPUT">";Z$:IF Z
$="1" THEN END ELSE GOTO10
460 PRINT:PRINT"THIS PROGRAM WIL
L ALLOW YOU TO"
470 PRINT"CHANGE THE DIRECTORY T
YPE OF"
480 PRINT"XMODEM FILES THAT HAVE
 BEEN UP-"
490 PRINT"LOADED TO COBBS! WHEN
THIS PRO-"
500 PRINT"GRAM ASKS FOR THE FILE
NAME GIVE"
510 PRINT"ONLY THE FILENAME! YOU
 WILL BE"
520 PRINT"PROMPTED FOR THE EXTEN
SION AND"
530 PRINT"DRIVE #. TO EXIT THIS
PROGRAM"
540 PRINT"JUST PRESS <ENTER> AT
THE FILE-"
550 PRINT"NAME, EXT, AND DRV PRO
MPTS"
560 PRINT:PRINT
570 LINEINPUT"PRESS <ENTER>...";
ZZ$
580 CLS
590 PRINT"TO TAKE A DIR ON A DRI
VE, PRESS"
600 PRINT"THE ENTER KEY IN RESPO
NSE TO "
610 PRINT"THE FILENAME AND THE E
XT"
620 PRINT"PROMPTS. THEN PRESS TH
E # OF"
630 PRINT"THE DRIVE ON WHICH YOU
 WISH TO"
640 PRINT"SEE A DIRECTORY."
650 PRINT:PRINT
660 RETURN
```

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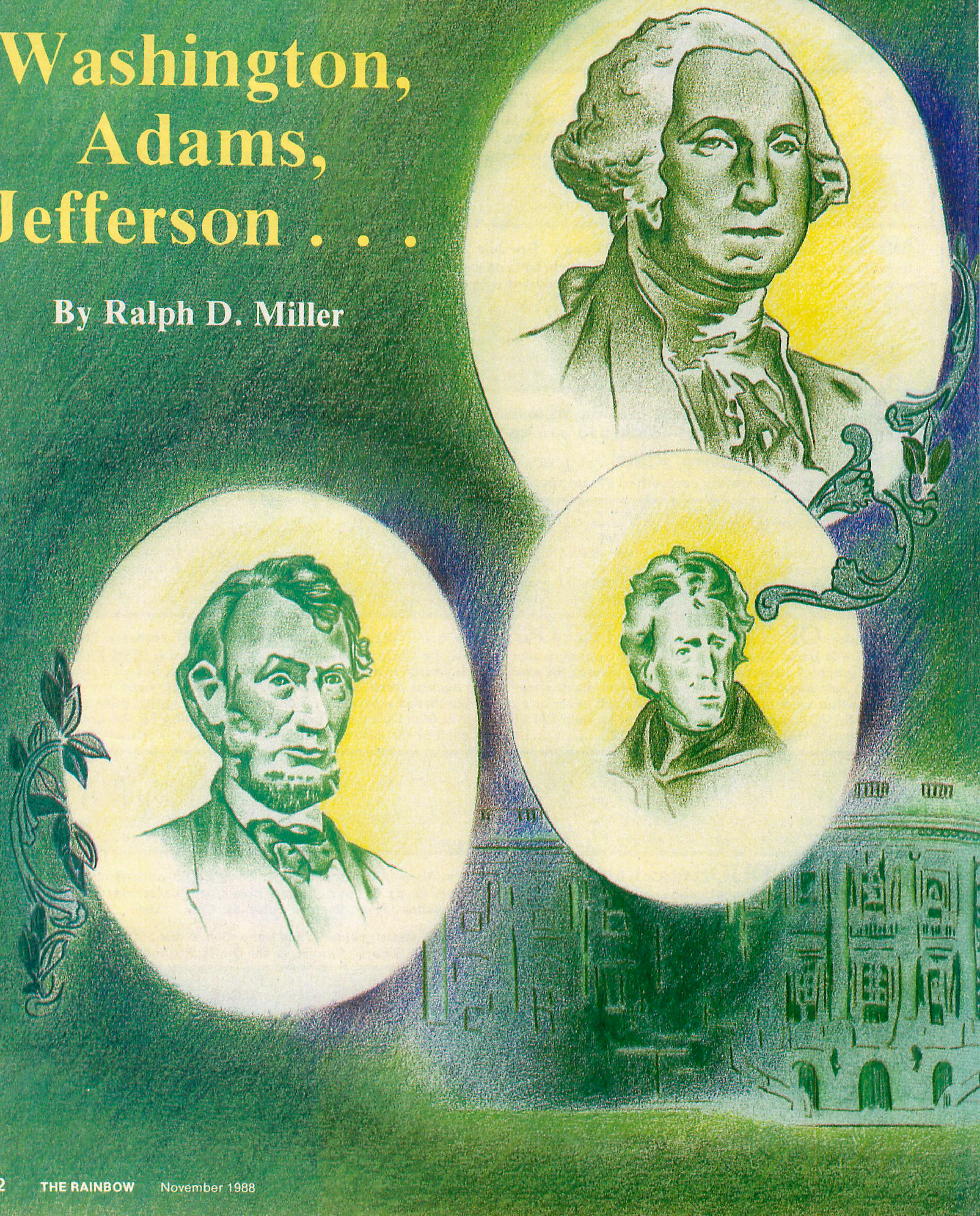
A program to help memorize the list of U.S. Presidents

Washington, Adams, Jefferson . . .

By Ralph D. Miller



16K Disk 16K Mod.

When my eldest daughter was assigned the learning of the list of presidents of the United States, I wrote *Presidents* to help her. It has been tested by members of her fifth grade class and found to be effective. The techniques used are quite simple, so it is a good choice for beginning programmers to use in experimenting with modifications.

As written, *Presidents* runs in 16K Extended Disk BASIC. Instructions follow to modify the program for cassette-based systems. It can also be made usable on non-extended machines by deleting lines 710, 720 and 730, and by changing `GOTO 710` in Line 172 to `GOTO 740`.

The printer baud rate is set in Line 740 and as written, is set for 2400 on my IDS-460 printer. For use at 600 baud, change `POKE150,17` in Line 740 to `POKE150,87`. For 1200 baud, use `POKE150,41`. Some systems prefer `POKE150,18` for 2400 baud operation. The only other printer code in the program is in Line 794 (`CHR$(12)`) for form feed.

Presidents is designed to run a directory program when you exit. The one that I use is *Hello* by Doug Heyza (August 1985, Page 69). If you don't want to use such a program, change Line 160 to `IF Z$="R" THEN CLS:DIR`.

To modify the program for cassette use, take `rETURN (TO DISK MENU)` out of Line 110, and delete the spaces after `MENU` until the 'q' in `qUIT` is directly under the 'h' in `hARD`. Next delete Line 160. Finally, in Line 130, delete `AND Z$<>"R"`.

That's about it! *Presidents* is neither long nor complex, so type it in and give the children a bit more perspective on history. I'm sure the comments on progress section (lines 915 through 935) could be much more creative, so add your own, perhaps personalized for your child.

(Questions or comments concerning this program may be directed to the author at P.O. Box 13322, Tallahassee, FL 32317. Please enclose an SASE when requesting a reply.) □

Ralph Miller is a broadcast engineer on the systems staff at John H. Phipps Broadcasting. He lives in Tallahassee, Florida.

```
100 ......179  900 ......243
220 ......119  930 ......252
740 ......131  END ......103
```

The Listing: PRESDENT

```
5 CLS
10 REM THIS PROGRAM (C) 1985 BY
RALPH D. MILLER, POB 13322, TALL
AHASSEE, FL 32317 (904) 386-3618
---ALL RIGHTS RESERVED---
22 PRINT
24 PRINT"              presdent"
26 PRINT
28 PRINT" **********************
********"
29 PRINT" ***** MEMORIZATION HEL
PER ****"
30 PRINT" ************ FOR *****
********"
31 PRINT" ****** U.S. PRESIDENTS
 *******"
32 PRINT" **********************
********"
33 PRINT" * (C)1985 BY RALPH D.
MILLER *"
34 PRINT" ******* (904) 386-3618
 *******"
35 PRINT" **********************
********"
36 PRINT" **** ALL RIGHTS  RESER
VED ****"
37 PRINT" **********************
********"
40 FOR T=1 TO 5000:NEXT T
100 DIM A$(40),B$(40),C$(40)
105 CLS:V=0
110 PRINT:PRINT:PRINT"      eASY
(LAST NAME ONLY)            hARD
(ENTIRE NAME)               rETUR
N (TO DISK MENU)            qUIT
(RETURN TO BASIC)          pRINT
 (HARDCOPY LIST)"
120 Z$=INKEY$:IF Z$="" THEN 120
130 IF Z$<>"E" AND Z$<>"H" AND Z
$<>"R" AND Z$<>"Q" AND Z$<>"P" T
HEN 105
140 IF Z$="E" THEN E$="LAST"
150 IF Z$="H" THEN E$="ENTIRE"
160 IF Z$="R" THEN RUN "DIRECTRY
"
170 IF Z$="Q" THEN POKE&H71,0:EX
EC&HA027
172 IF Z$="P" THEN GOTO 710
175 RESTORE
180 CLS
190 PRINT"BEGINNING WITH THE FIR
ST, INPUT EACH PRESIDENT'S "E$"
NAME,"
200 LINEINPUT"IN CHRONOLOGICAL O
RDER OF THEIR PRESIDENCY: ";F$
210 IF F$="" THEN GOTO 105
220 X=1:W=0
230 GOSUB 630
270 X=X+1
280 LINEINPUT"NEXT: ";F$
285 IF F$="" THEN GOTO 800
300 GOTO 230
630 READ A$(X),B$(X),C$(X)
635 IF C$(X)="REAGAN" THEN GOTO
900
637 IF Z$="E" THEN 672
640 IF B$(X)="N" THEN B$(X)="":D
$=A$(X)+" "+C$(X):GOTO 690
650 IF B$(X)<>"N" THEN D$=A$(X)+
" "+B$(X)+" "+C$(X)
660 IF LEN(B$(X))>1 THEN 690
670 D$=A$(X)+" "+B$(X)+"."+" "+C
$(X)
672 IF Z$="E" THEN D$=C$(X)
690 IF F$<>D$ THEN PRINT "SORRY.
 YOU SHOULD HAVE ENTERED: "D$:W=
W+1:GOTO 695
695 RETURN
710 V=PEEK(65314):IF V=4 OR V=6
THEN 740
720 CLS:PRINT@200,"printer off l
ine":V$=INKEY$:IF V$="" THEN 720
730 V=PEEK(65314):IF V=4 OR V=6
THEN 740
735 GOTO 105
740 POKE149,0:POKE150,17
742 CLS:PRINT@200,"now printing
list"
750 RESTORE
755 FOR Y=1 TO 40
760 READ A$(Y),B$(Y),C$(Y)
765 IF B$(Y)="N" THEN B$(Y)="":D
$=A$(Y)+" "+C$(Y):GOTO 790
770 IF B$(Y)<>"N" THEN D$=A$(Y)+
" "+B$(Y)+" "+C$(Y)
772 IF LEN(B$(Y))>1 THEN 790
774 D$=A$(Y)+" "+B$(Y)+"."+" "+C
$(Y)
790 PRINT#-2,D$
792 NEXT Y
794 PRINT#-2,CHR$(12)
795 GOTO 105
800 PRINT:PRINT"YOU HAVE GOTTEN
```

```
THROUGH"X-1
810 PRINT"PRESIDENTS."
820 PRINT"YOU GAVE"W"WRONG ANSWE
R(S)."
830 PRINT:PRINT:PRINT"       str
ike any key"
840 M$=INKEY$:IF M$="" THEN 840
845 GOTO 105
900 CLS
905 PRINT:PRINT"YOU HAVE GOTTEN 
THROUGH ALL     FORTY PRESIDENTS
.":PRINT
910 PRINT"YOU GAVE"W"WRONG ANSWE
R(S).":PRINT
915 IF W=0 THEN L$="INCREDIBLY S
TUPENDOUS,          MOVE OVER, E
INSTEIN!":GOTO 950
920 IF W<6 THEN L$="OUTSTANDING!
                    YOU WILL VER
Y SOON              HAVE THEM AL
L MASTERED.":GOTO 950
925 IF W<11 THEN L$="VERY GOOD! 
                     IT'S ALL DO
WNHILL               FROM HERE."
:GOTO 950
930 IF W<21 THEN L$="YOU'RE HALF
WAY THERE!":GOTO 950
935 IF W<31 THEN L$="YOU'VE MAST
ER A QUARTER OF      THEM! PRACT
ICE MAKES PERFECT!"
950 PRINT L$:PRINT:PRINT:PRINT"
      strike any key"
960 M$=INKEY$:IF M$="" THEN 960
970 GOTO 105
1000 DATA GEORGE,N,WASHINGTON,JO
HN,N,ADAMS,THOMAS,N,JEFFERSON,JA
MES,N,MADISON,JAMES,N,MONROE,JOH
N,QUINCY,ADAMS,ANDREW,N,JACKSON,
MARTIN,VAN,BUREN,WILLIAM,HENRY,H
ARRISON,JOHN,N,TYLER
1001 DATA JAMES,N,POLK,ZACHARY,N
,TAYLOR,MILLARD,N,FILLMORE,FRANK
LIN,N,PIERCE,JAMES,N,BUCHANAN,AB
RAHAM,N,LINCOLN,ANDREW,N,JOHNSON
,ULYSSES,S,GRANT,RUTHERFORD,B,HA
YES,JAMES,N,GARFIELD
1002 DATA CHESTER,N,ARTHUR,GROVE
R,N,CLEVELAND,BENJAMIN,N,HARRISO
N,GROVER,N,CLEVELAND,WILLIAM,N,M
CKINLEY,THEODORE,N,ROOSEVELT,WIL
LIAM,H,TAFT,WOODROW,N,WILSON,WAR
REN,G,HARDING,CALVIN,N,COOLIDGE
1003 DATA HERBERT,N,HOOVER,FRANK
LIN,D,ROOSEVELT,HARRY,S,TRUMAN,D
WIGHT,D,EISENHOWER,JOHN,F,KENNED
Y,LYNDON,B,JOHNSON,RICHARD,M,NIX
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```

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The BBSs in North America

For our Telecommunications issue, we at THE RAINBOW have compiled a list of bulletin board systems running in the United States and Canada. Our list was compiled with the help of all SysOps who answered our request for information. We hope this list will make BBS users aware of the BBS systems in their area.

Our list arranges known BBSs by state and includes the BBS phone number, BBS name and the parameters. The systems are up 24 hours a day, seven days a week, unless otherwise noted by a superscript after the BBS name. Use this list to sample various BBSs, and enjoy the chance try a new system.

If you are running a BBS and would like to have it listed in a future issue of the THE RAINBOW, send us a letter, including the information listed here to: The Rainbow BBS List, P.O. Box 385, Prospect, KY 40059.

State/City	BBS Name	Access Number	Parameters (Baud Rate-Parity-Word Bits-Stop Bits)	SysOp
Alabama				
Mobile	The Color Computer Board of Mobile	(205) 341-4610	300-E-7-1	Edward Jones
Arizona				
Glendale	The Exchange[1]	(602) 848-9902	300/1200-E-8-1	Charles Pippin
Phoenix	CoCo BBS-157	(602) 246-2131	300/1200-N-8-1	Curtiss Schuler
California				
Santa Ana	Color Galaxy	(714) 545-5156	300/1200-O-7-1	Tom Guzman
Connecticut				
Groton	CoConut Manor	(203) 449-1792	300/1200/2400-N-8-1	Ken Parsley
Florida				
Miami	Dade CoCo South	(305) 266-1099	300 to 1200-E-7-1	Robert Jones
Miami	The Matrix BBS	(305) 895-2312	300-N-8-1	Criss Malcom
North Miami	Dade CoCo North	(305) 893-2894	300-E-7-1	Alan Potter
St. Petersburg	The CCUG BBS	(813) 867-2284	300/1200-E-7-1	Tim Jay
Iowa				
Boone	The Tomb	(515) 432-7853	300/1200/2400-N-8-1	Steve Kratz
Illinois				
Chicago	The Mindmaster's Domain	(312) 463-8932	300/1200-N-8-1	David Lucas
Indiana				
Evansville	Disk Bank	(812) 422-4821	300/1200-E-7-1	Dave Jenkins
Shelbyville	Duke's Shelbyville Colorama	(317) 392-2769	300/1200-E-7-1	Duke Norris
Kentucky				
Bulan	Hackers BBS[2]	(606) 439-1853	300 to 1200-N-8-1	Kenny Napier
Maine				
Sanford	TreeTops BBS	(207) 490-2870	300/1200/2400-N-8-1	Michael Lescord

State/City	BBS Name	Access Number	Parameters (Baud Rate-Parity-Word Bits-Stop Bits)	SysOp
Michigan				
Bay City	Warped Board	(517) 686-7598	300/1200/2400-N-8-1	Dave Witucki
Bay City	Plastered Board	(517) 892-7885	300/1200/2400-N-8-1	Mark Danak
Manton	The Manton Modem	(616) 824-6026	300-E-7-1	Carl Johnson
Mississippi				
Meridian	The Compute Rama BBS[3]	(601) 693-8092	300-N-7-1	Kevin Sloan
Missouri				
Kansas City	The Frisky CoCo	(816) 436-2904	300/1200/2400-N-8-1	Jerry Oliver
Nebraska				
Wayne	Hardsector BBS[4]	(402) 375-1513	300-E-7-1	Nathan Tompkins
New Hampshire				
Manchester	CoComaster's BBS[5]	(603)644-4867	300-baud	George Proulx
New Jersey				
Hawthorne	DYM 399/ORA 18	(201) 427-8418	300/1200/2400-N-8-1	David Fischer
Mercerville	TAO BBS	(609) 587-2672	300/1200/2400-E-8-1	Bob Watson
New Milford	The Rainbow Connection Info System	(201) 967-1061	300/1200-N-8-1	Steve Rottinger
North Carolina				
Concord	The Data-Link	(704) 788-7867	300/1200-N-8-1	Jim Brock
Fayetteville	CoCo' nuts BBS	(919) 425-8242	300/1200-E-7-1	Tom Taylor
Gastonia	The BBS of Belmont Abbey College	(704) 825-6201	300 to 2400-E-8-2	Ron Millar
Newport	The Dungeon	(919) 726-9737	300/1200/2400-N-8-1	Chuck Katsekes
Ohio				
Bellaire	Harlock's Hideaway	(614) 676-2505	300/1200/2400-N-8-1	Dave Roth
Gallipolis	The Rainbow's End[6]	(614) 446-7430	300/1200-N-8-1	John Grubb
Sharonville	Omega	(513) 671-2049	300/1200/2400-N-8-1	Thomas Altum

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State/City	BBS Name	Access Number	Parameters (Baud Rate-Parity-Word Bits-Stop Bits)	SysOp
Pennsylvania				
Easton	ASCII-=80=-BBS	(215) 252-1608	300-E-7-1	Nevin Keller
Norristown	Graphics Pub BBS[7]	(215) 277-6951	300/1200/2400-N-8-1	Bob Montowski
Reading	The Glass Menagerie	(215) 376-1819	300/1200/2400-N-8-1	H. Allen Cravener
Rhode Island				
Providence	Tempo BBS	(401) 456-9394	300 to 2400-N-8-1	Arthur Mendoca
Tennessee				
Memphis	MCCUG BBS	(901) 458-9584	300/1200-E-7-1	B.J. Seaton
Utah				
Salt Lake	Data Warehouse of Salt Lake	(801) 969-6051	1200-N-8-1	
West Valley City	The CoCoshop BBS	(801) 250-1941	300/1200-N-8-1	Dennis & Terry Gray
Virginia				
Henry	Colorama 86 V4.0[8]	(703) 365-2018	1200-N-8-1	Ricky Sutphin
Washington				
Kennewick	The Time Machine	(509) 586-2559 or 586-2160	1200-E-7-1	Paul Alger
Kent	The CoCo Connection	(206) 854-3744	300/1200/2400-N-8-1	Corrie Bender
Spokane	Data Warehouse of Spokane	(509) 325-6787	300/1200-E-7-1	Dennis Mott
Wisconsin				
Gays Mills	CoCo BBS	(608) 735-4509	300/1200/2400-E-7-1	Robert & Daven Howard
Marshall	Madison Area Tandy Users BBS	(608) 274-6922 or 655-3806	300/1200/2400-N-8-1	
Canada:				
Alberta				
Letchbridge	Public BBS System of Letchbridge	(403) 329-6438	300/1200/2400-N-8-1	Dieter Rossman
Nova Scotia				
New Waterford	Chip to Chip BBS[9]	(902) 539-7743	300/1200-baud	Allan Jones
Ontario				
Angus	ECCC BBS	(705) 424-7570	300/1200/2400-N-8-1	Eldon Doucete
Scarborough	Remote Data Systems-09 (RDS-09)	(416) 283-7521	300/1200/2400-N-8-1	Doug Wright
Quebec				
La Tuque	Babillard du Club	(819) 523-4329	300-N-7-1	Renald Martin

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Notes:

[1] The Exchange is up from 6 p.m. to 6 a.m. Monday through Friday, and 24 hours Saturday and Sunday.

[2] Hackers BBS is up from 9:30 p.m. to 10 a.m., 7 days.

[3] The Computer Rama BBS is up from 10 p.m. to 1 p.m., 7 days.

[4] Hardsector BBS is up from 10:30 p.m. to 5 p.m., 7 days.

[5] Additional parameter information unavailable for CoCo master's BBS.

[6] The Rainbow's End is up from 6 p.m. to 11:30 p.m., Friday, Saturday and Sunday.

[7] Graphics Pub BBS is up from 7 p.m. to 7 a.m., 7 days.

[8] Colorama 86 V4.0 is up from 11:30 p.m. to 11:30 a.m., 7 days.

[9] Additional parameter information unavailable for Chip to Chip BBS.

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Modify an old favorite to use on the CoCo 3

A *Remote* Update

By Paul Alger

I've been running my own BBS for a few years and have always used THE RAINBOW'S *Remote* (November '85, Page 106) and *Remot232* (November '86, Page 70) as my terminal drivers. When I purchased my new CoCo 3, however, I found that the *Remote* programs were not compatible with 40- and 80-column screens. To alleviate this problem, I modified *Remot232* to allow the use of 40- and 80-column screens *and* to provide scroll- and `CLS`-protected areas on all screens. For those of you who would like to use the *Remote* programs in a 40- or 80-column format, allow me to present *Remote 3*.

Remote 3 will work on any CoCo that has at least 32K of memory. The program includes all of the *Remote* pro-

---

Paul Alger, SysOp for the Time Machine BBS, holds a bachelor's degree in audio engineering. Paul currently works as a professional musician.

grams' original bells and whistles except scroll-protection. To remedy this loss, I have included a software clock that allows 20 characters of scroll- and `CLS`-protection.

Included with this article are four listings. The first is the assembly listing for the *Remote 3*. This version of the program is for use with the RS-232 pack, and the pack *must be installed* before the program will work properly. (I do have a serial-port version of *Remote 3* and would be glad to send it to anyone who wants it. To receive that listing, please send me an SASE, a blank disk and the necessary postage. The address appears at the end of the article.)

Listing 2 is a software clock, which uses interrupts to allow the clock to be updated during disk access. The clock program provides `CLS`- and scroll-protection as well as a few other features I wanted for my BBS operation.

Listing 3 is a BASIC loader that creates *Remote 3* and the software clock in memory. It then saves these two programs as one *workable* ML file on tape or disk.

Finally, I've included a short demonstration program, Listing 4. This demonstration offers a few examples of the program's various uses, including those for the new features. This demo program can only be used on a CoCo 3 and online at 300 baud.

All program features are listed with their corresponding memory locations in Table 1. The descriptions presented for each location include both the program feature and the values used to achieve these results.

Remote 3 does have one small annoyance. The cursor does not self-destruct when the backspace key is pressed. If that bothers you, type the following:

```
POKE&H7D06,96
```

The bug (and the cursor) will disappear.

If you would like to sample a BBS that uses this terminal driver, give my BBS — the Time Machine — a try. Call (509) 586-2559 or (509) 586-2160. The BBS runs at 7-bit, 1 stop bit, even parity, 300/1200 baud, 24 hours a day. The BBS features a multi-player D & D game, a multi-player *World War* game and an updated version of my *Galactic Conflict* game. Give me a call sometime.

(Questions or comments concerning these programs may be directed to the author at 1303 West 26th, Kennewick, WA 99337. Please enclose an SASE when requesting a reply.) ☐

Table 1

Remote 3 Pokes

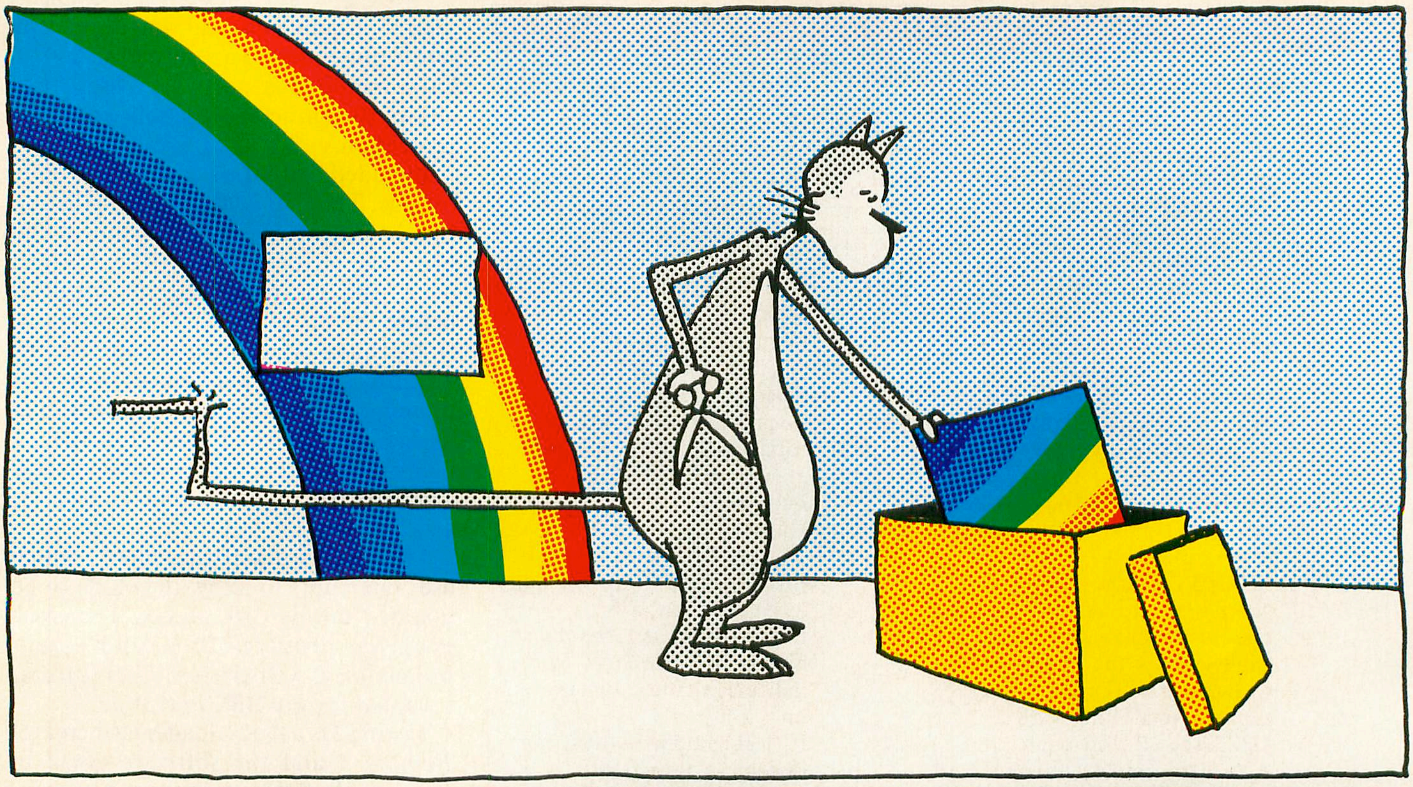
Location	Description
7D00	If 7D00 contains 1, the BREAK key is disabled from the remote user. If it contains 0, the remote user can use the BREAK key to break into BASIC.
7D01	If 7D01 contains 1, the incoming character is displayed in the right-hand corner of the scroll-protected area. If it contains 0, the feature is turned off.
7D02	If 7D02 contains 1, line feeds are sent with a carriage return. If it contains 0, no line feeds are sent.
7D03	If 7D03 contains 0, normal characters are sent to the remote terminal. Any other value echoes the character with that ASCII code to the remote terminal. `POKE&H7D03,65` will echo all A's to the remote terminal no matter what you see on your terminal screen. (Use this feature for password entry.)
7D04	If 7D04 contains 0, input from the remote terminal is not affected. A 1, however, converts the input from the remote terminal to all uppercase, and a 2 converts the input from the remote terminal to all lowercase.
7D05	This location works the same as 7D04 except that instead of the input, the output from the remote terminal is converted.
7D06	Cursor value (32-column screen only).
7D07 & 7D08	Used for scroll-protection in *Remote*. Poking here has no effect on *Remote 3*.

Clock Pokes

Location	Description
7F00 to 7F14	These locations contain a 20-byte `CLS`- and scroll-protected area. Poke the string to be protected into this area.
7F1D	Each time the clock reaches 24:00 (midnight), this location increments by 1. Peek this location to roll over the date.
7F1E	Location 7F1E contains a count-down timer. When a user logs on, poke the number of minutes you allow the user to remain online. Periodically peek this location. Time is up when the value is 0.
7F20	If 7F20 contains 1, the clock display is turned off. A 0 indicates that the display is on.
7F21	If 7F21 contains 0, the string display is turned off. A 1 indicates that the string is displayed.
7F22	If 7F22 contains 0, the "chat" flag is turned off. A 1 indicates that the flag is on. The "chat" flag flashes in the right-hand corner of the scroll-protected area.
7F23	This is the clock speed. The default value is 50. Poking any other value in this location changes the speed of the clock. The higher the number, the slower the clock.
7FD5	This location will invert the clock display on the 32-column screen only. If the location contains 48, the clock will appear green on a black background. If it is 112, the clock will appear black on a green background. Any other value will produce garbage in the clock display.

Listing 1:

```
00100 *************************
00110 *  REMOTE 3 FOR 232 PAC *
00120 * A TERMINAL DRIVER FOR *
00130 * THE COCO 3 & RS232 PAC*
00140 * FROM THE ORIGINAL     *
00150 * REMOTE PROGRAM BY     *
00160 * DAN DOWNARD RAINBOW   *
00170 *       11/83           *
00180 * MODIFIED BY           *
00190 * SCOTT TAYLOR RAINBOW  *
00200 *       11/85           *
00210 * MODIFIED FOR RS 232 BY*
00220 * MARK CROSBY RAINBOW   *
00230 *       11/86           *
```



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```
                      00240 * MODIFIED FOR COCO 3 BY*
                      00250 * PAUL ALGER            *
                      00252 *         6/88          *
                      00254 ************************
7D00                  00260         ORG     $7D00
                      00270 *EQUATES FOR ROM AND RAM
          016A        00280 IHOOK   EQU     $016A
          0167        00290 OHOOK   EQU     $0167
          A000        00300 POLCAT  EQU     $A000
          006F        00310 DEV     EQU     $6F
          0070        00320 FLAG    EQU     $70
7D00      01          00330 BREAK   FCB     $01
7D01      01          00340 CORNER  FCB     $01
7D02      01          00350 LFFLG   FCB     $01
7D03      00          00360 PRTFLG  FCB     $00
7D04      00          00370 ICASE   FCB     $00
7D05      00          00380 OCASE   FCB     $00
7D06      9F          00390 CURSOR  FCB     $9F
7D07      0400        00400 NOSCRL  FDB     $400
7D09      00          00410 COUNTR  FCB     $00
7D0A                  00420 TABLE   RMB     $28
                      00430 *INITIALIZE RAM HOOKS
7D32 BE   0168        00440 START   LDX     1+OHOOK
7D35 AF   8D 008B     00450         STX     1+ORET2,PCR
7D39 BE   016B        00460         LDX     1+IHOOK
7D3C AF   8D 00F1     00470         STX     1+IRET2,PCR
7D40 86   7E          00480         LDA     #$7E
7D42 B7   0167        00490         STA     OHOOK
7D45 B7   016A        00500         STA     IHOOK
7D48 30   8D 0048     00510         LEAX    OUT,PCR
7D4C BF   0168        00520         STX     1+OHOOK
7D4F 30   8D 0073     00530         LEAX    IN,PCR
7D53 BF   016B        00540         STX     1+IHOOK
                      00550 * MOVE TABLE OF ROM ADDRESS
                      00560 *SET INKEY$ TO ROM BASED ROUTINE
7D56 8E   AA29        00570 MOVTBL  LDX     #$AA29
7D59 31   8C AE       00580         LEAY    TABLE,PCR
7D5C 10BF 0128        00590         STY     $128
7D60 EC   81          00600 GETADD  LDD     ,X++
7D62 ED   A1          00610         STD     ,Y++
7D64 8C   AA51        00620         CMPX    #$AA51
7D67 26   F7          00630         BNE     GETADD
7D69 30   8D 0005     00640         LEAX    INKEY,PCR
7D6D 31   3C          00650         LEAY    -4,Y
7D6F AF   A4          00660         STX     ,Y
7D71 39               00670 RET     RTS
                      00680 *CHECK KEYBOARD AND
                      00690 *RS232 FOR INKEY$ 255
                      00700 *TIMES IF NOTHING IN $87
7D72 96   87          00710 INKEY   LDA     <$87
7D74 26   15          00720         BNE     YES
7D76 86   FF          00730         LDA     #$FF
7D78 B7   7D09        00740         STA     COUNTR
7D7B AD   9F A000     00750 INKEY2  JSR     [POLCAT]
7D7F 26   0A          00760         BNE     YES
7D81 BD   7DE6        00770         JSR     REMIN
7D84 26   05          00780         BNE     YES
7D86 7A   7D09        00790         DEC     COUNTR
7D89 26   F0          00800         BNE     INKEY2
                      00810 *CHARACTER IN A REGISTER
                      00820 *BRANCH IF BREAK (A=$03)
                      00830 *CONVERT TO STRING
7D8B 81   03          00840 YES     CMPA    #$03
```

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```
7D8D 1027 3078     00850           LBEQ     $AE09
7D91 7E   A56B     00860           JMP      $A56B
                   00870 *OUTPUT CHARACTER IF DEV=0
                   00880 *INSERT LINE FEEDS IF NEEDED
                   00890 *USE NEW PRINT ROUTINE
7D94 34   06       00900 OUT       PSHS     A,B
7D96 0D   6F       00910           TST      <DEV
7D98 26   27       00920           BNE      ORET1
7D9A 81   08       00930           CMPA     #$08
7D9C 27   1A       00940           BEQ      RMOUT2
7D9E 81   0D       00950           CMPA     #$0D
7DA0 26   0E       00960           BNE      REMOUT
                   00970 *CHECK IF LINE FEEDS ARE
                   00980 *TO BE SENT TO REMO TERM
7DA2 F6   7D02     00990           LDB      LFFLG
7DA5 27   11       01000           BEQ      RMOUT2
7DA7 86   0A       01010           LDA      #$0A
7DA9 BD   7E33     01020           JSR      RSOUT
7DAC 86   0D       01030           LDA      #$0D
7DAE 20   08       01040           BRA      RMOUT2
                   01050 *ECHO CHARACTER IN PRTFLG
                   01060 *IF IT IS NOT = TO 0
7DB0 F6   7D03     01070 REMOUT    LDB      PRTFLG
7DB3 27   03       01080           BEQ      RMOUT2
7DB5 B6   7D03     01090           LDA      PRTFLG
                   01100 *CHECK OUTPUT FOR UPPER-C
                   01110 *OR LOWER-C AND SEND IT
7DB8 F6   7D05     01120 RMOUT2    LDB      OCASE
7DBB BD   7E0A     01130           JSR      CKCASE
7DBE BD   7E33     01140           JSR      RSOUT
7DC1 35   06       01150 ORET1     PULS     A,B
7DC3 7E   7D71     01160 ORET2     JMP      RET
                   02000 *INPUT FROM KEYBOARD OR
                   02010 *RS-232 IF DEV=0
                   02020 *USE RSIN FOR REMOTE INPUT
7DC6 B6   7D06     02030 IN        LDA      CURSOR
7DC9 A7   9F 0088  02040           STA      [$88]
7DCD 0F   70       02050           CLR      <FLAG
7DCF 0D   6F       02060           TST      <DEV
7DD1 26   5D       02070           BNE      IRET2
7DD3 32   62       02080           LEAS     2,S
7DD5 34   15       02090           PSHS     B,CC,X
7DD7 AD   9F A000  02100 IN1       JSR      [POLCAT]
7DDB 27   02       02110           BEQ      RSCHK
7DDD 20   4F       02120           BRA      NOCHNG
7DDF BD   7DE6     02130 RSCHK     JSR      REMIN
7DE2 27   F3       02140           BEQ      IN1
7DE4 20   42       02150           BRA      IRET1
7DE6 F6   FF69     02160 REMIN     LDB      $FF69
7DE9 C4   08       02170           ANDB     #$08
7DEB 27   18       02180           BEQ      ZEROA
                   02190 *RS-232 INPUT FROM CART
7DED C4   07       02200 RSAN      ANDB     #$07
7DEF 26   14       02210           BNE      ZEROA
7DF1 B6   FF68     02220           LDA      $FF68
                   02230 *STORE CHAR IN UPPER RIGHT
                   02240 *CORNER OF 32 COL. SCREEN
7DF4 F6   7D01     02250           LDB      CORNER
7DF7 27   03       02260           BEQ      CHKBRK
7DF9 B7   041F     02270           STA      $41F
                   02280 *CHECK FOR BREAK DISABLE
                   02290 *AND FOR BREAK SIGNAL
                   02300 *FROM REMOTE TERMINAL
```

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette or disk) to:

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```
7DFC F6    7D00        02310 CHKBRK  LDB      BREAK
7DFF 27    06          02320         BEQ      NOTBRK
7E01 81    03          02330         CMPA     #$03
7E03 26    02          02340         BNE      NOTBRK
7E05 4F                02350 ZEROA   CLRA
7E06 39                02360         RTS
7E07 F6    7D04        02370 NOTBRK  LDB      ICASE
                       02380 *CHECK IF CHAR SHOULD BE
                       02390 *UPPER OR LOWERCASE AND
                       02400 *CHANGE IT ACCORDINGLY
7E0A C1    01          02410 CKCASE  CMPB     #$01
7E0C 26    0B          02420         BNE      CMPB2
7E0E 81    61          02430         CMPA     #$61
7E10 25    15          02440         BLO      RET2
7E12 81    7A          02450         CMPA     #$7A
7E14 22    11          02460         BHI      RET2
7E16 80    20          02470         SUBA     #$20
7E18 39                02480         RTS
7E19 C1    02          02490 CMPB2   CMPB     #$02
7E1B 26    0A          02500         BNE      RET2
7E1D 81    41          02510         CMPA     #$41
7E1F 25    06          02520         BLO      RET2
7E21 81    5A          02530         CMPA     #$5A
7E23 22    02          02540         BHI      RET2
7E25 8B    20          02550         ADDA     #$20
7E27 39                02560 RET2    RTS
7E28 C6    60          02570 IRET1   LDB      #$60
7E2A E7    9F 0088     02580         STB      [$88]
7E2E 35    95          02590 NOCHNG  PULS     B,CC,X,PC
7E30 7E    7D71        02600 IRET2   JMP      RET
7E33 34    04          02610 RSOUT   PSHS     B
7E35 F6    FF69        02620 RSOUT1  LDB      $FF69
7E38 C4    10          02630         ANDB     #$10
7E3A 27    F9          02640         BEQ      RSOUT1
7E3C B7    FF68        02650         STA      $FF68
7E3F 35    04          02660         PULS     B
7E41 39                02670         RTS
                       02680 *
7E42                   02690 ZZZZ    *******
           7D32        02700         END      START

00000 TOTAL ERRORS
```

Listing 2:

```
                       00100 ***************************
                       00110 *  CLOCK FOR REMOTE 3     *
                       00120 *       BY PAUL ALGER     *
                       00125 *WITH SPECIAL THANKS TO   *
                       00130 *     WAYNE LAFFARDY      *
                       00170 ***************************
7EB4                   00180         ORG      $7EB4
                       00190 *SUBROUTINE FOR COCO3
                       00200 *CONVERTS 32 CHAR TO
                       00210 *40-80 COLM CHARACTERS.
7EB4 BE    E000        00220 COCO3   LDX      $E000
7EB7 8C    00E6        00230         CMPX     #$00E6
7EBA 26    40          00240         BNE      RETCO3
7EBC 96    E7          00250         LDA      $E7
7EBE 27    3C          00260         BEQ      RETCO3
7EC0 8E    2F60        00270         LDX      #$2F60
7EC3 81    02          00280         CMPA     #$02
7EC5 27    03          00290         BEQ      COL80
7EC7 8E    2790        00300         LDX      #$2790
```

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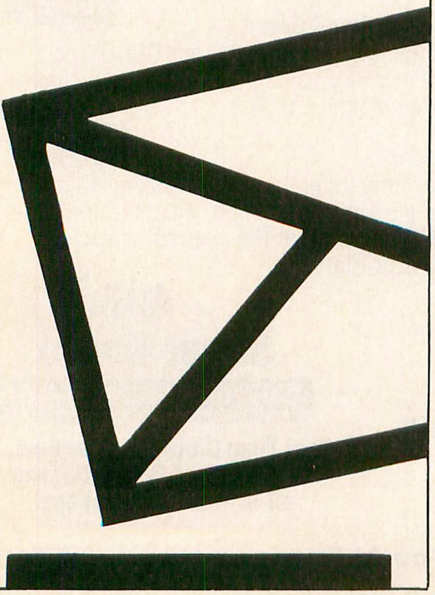

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(continued on Page 120)

```
7ECA 108E 0400     00310 COL80    LDY      #$400
7ECE 86   36       00320          LDA      #$36
7ED0 B7   FFA1     00330          STA      $FFA1
                   00340 *TRANSFER DATA FROM 32
                   00350 *COLUMN SCREEN TO 40-80
                   00360 *COLUMN SCREEN.
7ED3 A6   A0       00370 COPY     LDA      ,Y+
7ED5 81   1B       00380          CMPA     #27
7ED7 25   06       00390          BLO      ADD96
7ED9 81   5A       00400          CMPA     #90
7EDB 22   06       00410          BHI      ADD64
7EDD 20   06       00420          BRA      STORE
7EDF 8B   60       00430 ADD96    ADDA     #96
7EE1 20   02       00440          BRA      STORE
7EE3 8B   40       00450 ADD64    ADDA     #64
7EE5 A7   81       00460 STORE    STA      ,X++
7EE7 108C 0420     00470          CMPY     #$420
7EEB 26   E6       00480          BNE      COPY
                   00490 *CLEAR CHAT FLAG
7EED B6   7F22     00500          LDA      CHAT
7EF0 26   05       00510          BNE      GIMME
7EF2 86   60       00520          LDA      #96
7EF4 B7   041E     00530          STA      $41E
7EF7 86   39       00540 GIMME    LDA      #$39
7EF9 B7   FFA1     00550          STA      $FFA1
7EFC B6   FF03     00560 RETCO3   LDA      $FF03
7EFF 39            00570          RTS
                   00580 *SET UP STRING AREA AND
                   00590 *VARIABLES
7F00               00600 STRING   RMB      $15
7F15      00       00610 HOUR1    FCB      $00
7F16      00       00620 HOUR2    FCB      $00
7F17      0A       00630 COLON1   FCB      $0A
7F18      00       00640 MIN1     FCB      $00
7F19      00       00650 MIN2     FCB      $00
7F1A      0A       00660 COLON2   FCB      $0A
7F1B      00       00670 SEC1     FCB      $00
7F1C      00       00680 SEC2     FCB      $00
7F1D      00       00690 DAY      FCB      $00
7F1E      00       00700 CLOCK2   FCB      $00
7F1F      00       00710 HOUR     FCB      $00
7F20      00       00720 DSPLAY   FCB      $00
7F21      00       00730 DISPLN   FCB      $00
7F22      00       00740 CHAT     FCB      $00
7F23      32       00750 CLKSPD   FCB      $32
7F24      00       00760 COUNT    FCB      $00
                   00770 *SET UP HOOKS
7F25 8E   7F33     00780 INIT     LDX      #START
7F28 BF   010D     00790          STX      $010D
7F2B 86   35       00800          LDA      #$35
7F2D B7   FF03     00810          STA      $FF03
7F30 1C   EF       00820          ANDCC    #$EF
7F32 39            00830          RTS
                   00840 *SET UP CLOCK TICK AND
                   00850 *INCREMENT CLOCK
7F33 7C   7F24     00860 START    INC      COUNT
7F36 B6   7F24     00870          LDA      COUNT
7F39 B1   7F23     00880          CMPA     CLKSPD
7F3C 25   6A       00890          BCS      DSPLY
7F3E 7F   7F24     00900          CLR      COUNT
7F41 7C   7F1C     00910          INC      SEC2
7F44 B6   7F1C     00920          LDA      SEC2
```

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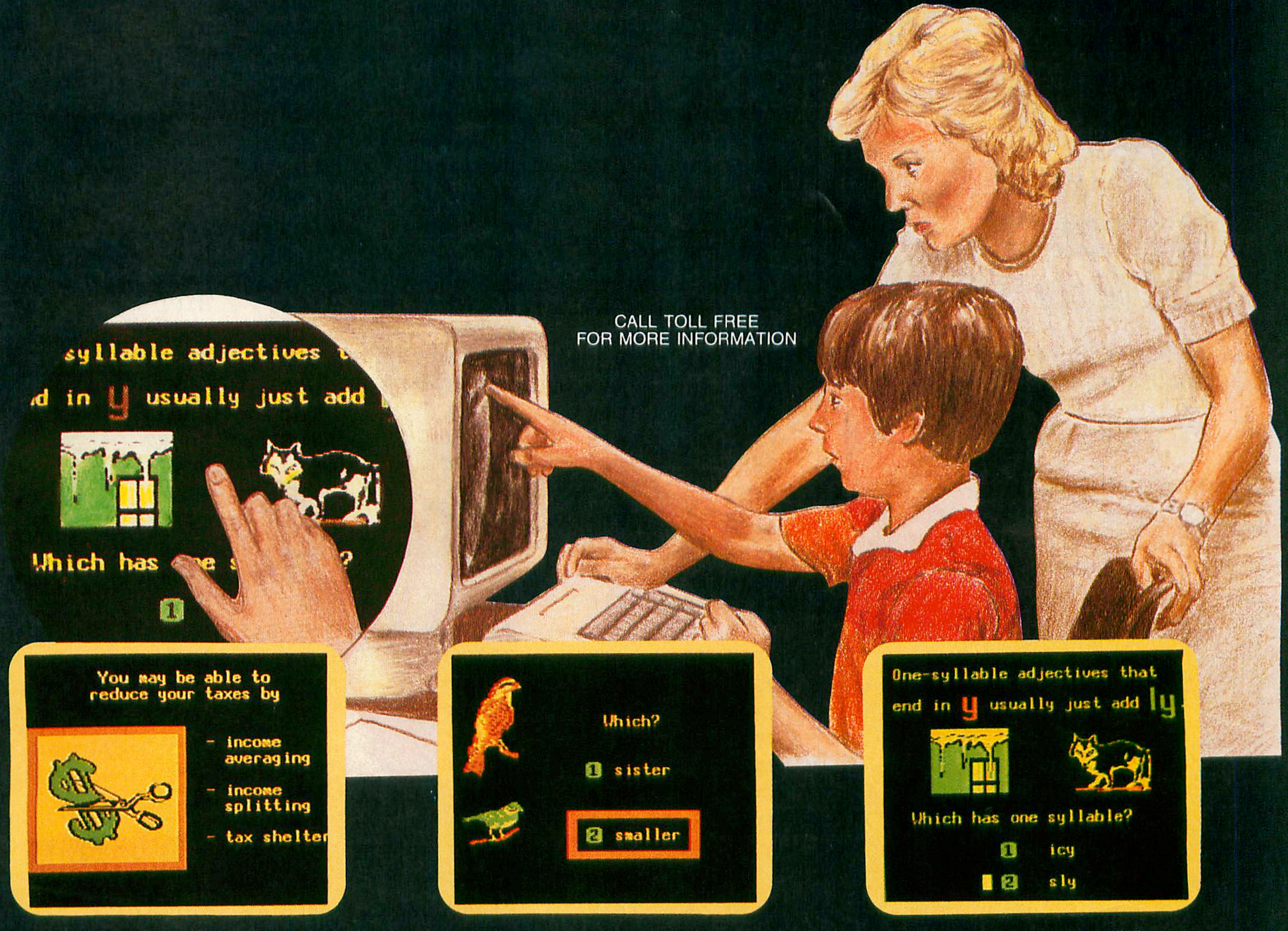
syllable adjectives
d in y usually just add
Which has one s ?
1
You may be able to reduce your taxes by
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- income splitting
- tax shelter
Which?
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2 smaller
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2 sly

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```
7F47 81   0A     00930        CMPA    #$0A
7F49 25   5D     00940        BCS     DSPLY
7F4B 7F   7F1C   00950        CLR     SEC2
7F4E 7C   7F1B   00960        INC     SEC1
7F51 B6   7F1B   00970        LDA     SEC1
7F54 81   06     00980        CMPA    #$06
7F56 25   50     00990        BCS     DSPLY
7F58 7F   7F1B   01000        CLR     SEC1
7F5B B6   7F1E   01010        LDA     CLOCK2
7F5E 81   00     01020        CMPA    #$00
7F60 27   04     01030        BEQ     START1
7F62 4A          01040        DECA
7F63 B7   7F1E   01050        STA     CLOCK2
7F66 7C   7F19   01060 START1 INC     MIN2
7F69 B6   7F19   01070        LDA     MIN2
7F6C 81   0A     01080        CMPA    #$0A
7F6E 25   38     01090        BCS     DSPLY
7F70 7F   7F19   01100        CLR     MIN2
7F73 7C   7F18   01110        INC     MIN1
7F76 B6   7F18   01120        LDA     MIN1
7F79 81   06     01130        CMPA    #$06
7F7B 25   2B     01140        BCS     DSPLY
7F7D 7F   7F18   01150        CLR     MIN1
7F80 7C   7F1F   01160        INC     HOUR
7F83 7C   7F16   01170        INC     HOUR2
7F86 B6   7F1F   01180        LDA     HOUR
7F89 81   18     01190        CMPA    #24
7F8B 25   0E     01200        BCS     GO
7F8D 7F   7F1F   01210        CLR     HOUR
7F90 7F   7F15   01220        CLR     HOUR1
7F93 7F   7F16   01230        CLR     HOUR2
                 01240 *INCREMENT DAY FLAG
7F96 7C   7F1D   01250        INC     DAY
7F99 20   0D     01260        BRA     DSPLY
7F9B B6   7F16   01270 GO     LDA     HOUR2
7F9E 81   0A     01280        CMPA    #$0A
7FA0 25   06     01290        BCS     DSPLY
7FA2 7F   7F16   01300        CLR     HOUR2
7FA5 7C   7F15   01310        INC     HOUR1
                 01320 *CHECK IF DISPLAY IS ON OR
                 01330 *OFF
7FA8 B6   7F20   01340 DSPLY  LDA     DSPLAY
7FAB 26   31     01350        BNE     RETURN
                 01360 *INCREMENT CHAT FLAG IF SET
7FAD B6   7F22   01370        LDA     CHAT
7FB0 27   03     01380        BEQ     DSPLY0
7FB2 7C   041E   01390        INC     $41E
                 01400 *DISPLAY STRING IF DISPLN SET
7FB5 B6   7F21   01410 DSPLY0 LDA     DISPLN
7FB8 27   11     01420        BEQ     DSPLY2
7FBA 8E   0400   01430        LDX     #$400
7FBD 108E 7F00   01440        LDY     #$7F00
7FC1 A6   A0     01450 DSPLY1 LDA     ,Y+
7FC3 A7   80     01460        STA     ,X+
7FC5 108C 7F15   01470        CMPY    #$7F15
7FC9 25   F6     01480        BCS     DSPLY1
                 01490 *PRINT CURRENT TIME IF DISPLY SET
7FCB 8E   0416   01500 DSPLY2 LDX     #$416
7FCE 108E 7F15   01510        LDY     #$7F15
7FD2 A6   A0     01520 DSPLY3 LDA     ,Y+
7FD4 8B   30     01530        ADDA    #$30
7FD6 A7   80     01540        STA     ,X+
```

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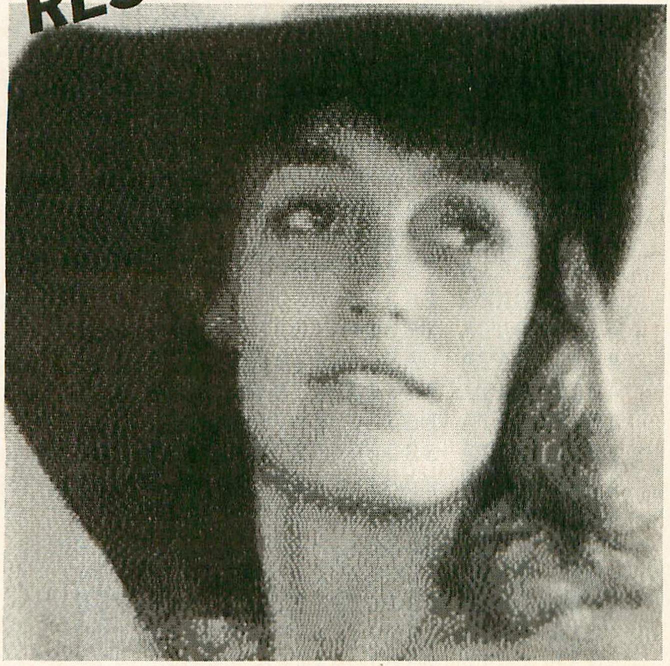

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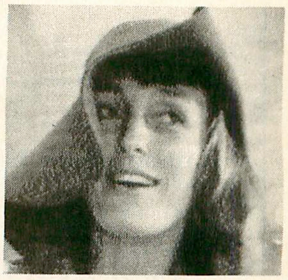

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```
7FD8 108C 7F1D      01550         CMPY     #$7F1D
7FDC 25   F4        01560         BCS      DSPLY3
7FDE 17   FED3      01570 RETURN  LBSR     COCO3
7FE1 2A   1C        01580         BPL      GO3
7FE3 B6   FF02      01590         LDA      $FF02
7FE6 B6   0985      01600         LDA      $0985
7FE9 27   11        01610         BEQ      GO4
7FEB 4A             01620         DECA
7FEC B7   0985      01630         STA      $0985
7FEF 26   0B        01640         BNE      GO4
7FF1 B6   0986      01650         LDA      $0986
7FF4 84   B0        01660         ANDA     #$B0
7FF6 B7   0986      01670         STA      $0986
7FF9 B7   FF40      01680         STA      $FF40
7FFC 7E   8955      01690 GO4     JMP      $8955
7FFF 3B             01700 GO3     RTI
          0000      01710         END

00000 TOTAL ERRORS
```

140 92
4025 159
4053 22
END 99

Listing 3: BASLOAD

```
1 'BASIC LOADER FOR REMOTE 3
5 CLEAR1000,&H7CFF
10 CLS(0):PRINT@171,"POKING M/L"
;
20 Z5=&H7D00:LN=3999:FORZ=1TO41:
READA$,B$:Z4=VAL("&H"+B$):LN=LN+
1
30 Z3=0:PRINT@228,"READING DATA
LINE"LN;:FORZ1=1TO LEN(A$) STEP2
40 Z2=VAL("&H"+MID$(A$,Z1,2)):Z3
=Z3+Z2:POKEZ5,Z2:Z5=Z5+1
50 NEXTZ1:IFZ3<>Z4 THENPRINT@416
,"DATA ERROR IN LINE"LN;:END
60 NEXTZ
70 Z5=&H7EB4:LN=4999:FORZ=1TO42:
READA$,B$:Z4=VAL("&H"+B$):LN=LN+
1
80 Z3=0:PRINT@228,"READING DATA
LINE"LN;:FORZ1=1TO LEN(A$) STEP2
90 Z2=VAL("&H"+MID$(A$,Z1,2)):Z3
=Z3+Z2:POKEZ5,Z2:Z5=Z5+1
100 NEXTZ1:IFZ3<>Z4 THENPRINT@41
6,"DATA ERROR IN LINE"LN:END
110 NEXTZ
120 CLS(0)
130 SAVEM"REMOTE3.BIN",&H7D00,&H
7FFF,&H7D32
140 POKE65386,107:POKE65387,54'
CONFIGURE RS232 PAC FOR 7-E-1 @
300 BAUD
150 CLS:EXEC&H7D32:PRINT"REMOTE
3 IS NOW INSTALLED AND   RUNNING
 AT 300 BAUD!":END
4000 DATA 01010000009F04,A6
4001 DATA 0000FFFFFFFFFFFF,5FA
4002 DATA FFFFFFFFFFFFFFFF,7F8
4003 DATA FFFFFFFFFFFFFFFF,7F8
4004 DATA FFFFFFFFFFFFFFFF,7F8
4005 DATA FFFFFFFFFFFFFFFF,7F8
4006 DATA FFFFBE0168AF8D00,461
4007 DATA 8BBE016BAF8D00F1,3E2
4008 DATA 867EB70167B7016A,345
4009 DATA 308D0048BF016830,25D
4010 DATA 8D0073BF016B8EAA,363
4011 DATA 29318CAE10BF0128,28C
4012 DATA EC81EDA18CAA5126,4A8
4013 DATA F7308D0005313CAF,2D5
4014 DATA A4399687261586FF,3BA
4015 DATA B77D09AD9FA00026,34F
4016 DATA 0ABD7DE626057A7D,34C
4017 DATA 0926F08103102730,20A
4018 DATA 787EA56B34060D6F,2BC
4019 DATA 262781082 71A810D,1A5
4020 DATA 260EF67D02271186,267
4021 DATA 0ABD7E33860D2008,233
4022 DATA F67D032703B67D03,2D6
4023 DATA F67D05BD7E0ABD7E,3F8
4024 DATA 3335067E7D71B67D,30D
4025 DATA 06A79F00880F700D,260
4026 DATA 6F265D32623415AD,27C
4027 DATA 9FA000270 2204FBD,294
4028 DATA 7DE627F32042F6FF,4D4
4029 DATA 69C40827 18C40726,265
4030 DATA 14B6FF68F67D0127,3CC
4031 DATA 03B7041FF67D0027,277
4032 DATA 0681032602 4F39F6,230
4033 DATA 7D04C101260B8161,256
4034 DATA 2515817A22118020,208
4035 DATA 39C102260A814125,213
4036 DATA 06815A22028B2039,1E9
```

```
4037 DATA C660E79F00883595,3FE
4038 DATA 7E7D713404F6FF69,402
4039 DATA C41027F9B7FF6835,447
4040 DATA 0439FF,13C
4041 DATA BEE0008C00E62640,376
4042 DATA 96E7273C8E2F6081,37E
4043 DATA 0227038E2790108E,20F
4044 DATA 04008636B7FFA1A6,3BD
4045 DATA A0811B2506815A22,264
4046 DATA 0620068B6020028B,1C4
4047 DATA 40A781108C042026,24E
4048 DATA E6B67F2226058660,34E
4049 DATA B7041E8639B7FFA1,3EF
4050 DATA B6FF03395254434C,326
4051 DATA 4F434B2042592050,208
4052 DATA 41554C20414C4745,21B
4053 DATA 5200000A00000A00,66
4054 DATA 0000000000000032,32
4055 DATA 008E7F33BF010D86,293
4056 DATA 35B7FF031CEF397C,3AE
4057 DATA 7F24B67F24B17F23,34F
4058 DATA 256A7F7F247C7F1C,2C8
4059 DATA B67F1C810A255D7F,2DD
4060 DATA 7F1C7C7F1BB67F1B,301
4061 DATA 810625507F7F1BB6,2CB
4062 DATA 7F1E810027044AB7,24A
4063 DATA 7F1E7C7F19B67F19,2FF
4064 DATA 810A25387F7F197C,27B
4065 DATA 7F18B67F18810625,290
4066 DATA 2B7F7F187C7F1F7C,2D7
4067 DATA 7F16B67F1F811825,2A7
4068 DATA 0E7F7F1F7F7F157F,2BD
4069 DATA 7F167C7F1D200DB6,290
4070 DATA 7F16810A25067F7F,249
4071 DATA 167C7F15B67F2026,2A1
4072 DATA 31B67F2227037C04,232
4073 DATA 1EB67F2127118E04,23E
4074 DATA 00108E7F00A6A0A7,30A
4075 DATA 80108C7F1525F68E,359
4076 DATA 0416108E7F15A6A0,292
4077 DATA 8B30A780108C7F1D,31A
4078 DATA 25F417FED32A1CB6,3FD
4079 DATA FF02B6098527114A,2C7
4080 DATA B70985260BB60986,2BB
4081 DATA 84B0B70986B7FF40,470
4082 DATA 7E89553B,197
```

140 ......**206**
310 ....**78**
440 ......**209**
1020 ......**71**
END **50**

Listing 4: REMDEMO

```
10 CLEAR200,&H7CFF
20 DEFUSR0=&H7F25'CLOCK PROGRAM
START
25 CLS:PRINT
```

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```
26 PRINT"IS REMOTE 3 INSTALLED?"
:LINEINPUTA$:IFLEFT$(A$,1)="Y"TH
EN40
30 LINEINPUT"ENTER FILENAME OF R
EMOTE3      PROGRAM. ";FI$:LOAD
M FI$:FORZ=1TO1000:NEXT:EXEC
40 POKE65386,107:POKE65387,54'SE
T RS232 PAC AT 7-E-1, 300 BAUD
60 A=USR0(0)'START CLOCK
70 PRINT"ENTER CURRENT TIME AS 2
4 HOUR   MILITARY TIME.":PRINT"E
NTER HOUR ";:LINEINPUTH$:H=VAL(H
$):PRINT"ENTER MINUTES ";:LINEIN
PUTM$:M=VAL(M$)
80 '*** CHECK FOR PROPER INPUT *
**
90 IFH<0 OR H>23 OR M<0 OR M>59
THEN70
100 IF H>9 THENH1=VAL(LEFT$(H$,1
)) ELSEH1=0
110 H2=VAL(RIGHT$(H$,1))
120 IF M>9 THEN M1=VAL(LEFT$(M$,
1)) ELSE M1=0
130 M2=VAL(RIGHT$(M$,1))
140 '*** POKE CURRENT TIME TO CL
OCK ***
150 POKE&H7F15,H1:POKE&H7F16,H2:
POKE&H7F18,M1:POKE&H7F19,M2:POKE
&H7F1F,H:POKE&H7F1B,0:POKE&H7F1C
,0
160 INPUT"COCO 3";C$:IFLEFT$(C$,
1)="Y"THENGOSUB1000
200 MOTORON:POKE65387,54:IFC$="Y
"THENCLS(2) ELSE CLS(0)
210 K=PEEK(65385) AND 32:IFK=0TH
EN230
220 IF PEEK(&H152)<>255 THENPOKE
B+253,1:MOTOROFF:POKE65387,63:X=
19200:GOTO240 ELSE 210
230 X=300
240 '**** SOMEONE IS LOGGING ON
****
245 POKE&H7F20,0:POKE&H7F21,1'TU
RN ON NAME AND CLOCK DISPLAY
250 PRINT"CONNECTED AT"X:FORZ=1T
O800:NEXT
260 IFC$="Y"THEN WIDTH80
300 PRINTCHR$(12):CLS:PRINT"Remo
te 3 demo.":PRINT:PRINT"Who am I
 talking to? ";:LINEINPUTNA$
302 POKE&H7F1E,10'SET 10 MINUTE
TIME LIMIT
305 '*** POKE NAME INTO CLOCK FO
R CLS AND SCROLL PROTECT ***
310 IF LEN(NA$)>21 THEN NA$=LEFT
$(NA$,21) ELSE NA$=NA$+STRING$(2
1-LEN(NA$),32)
320 FORZ=1TO LEN(NA$):Z1=ASC(MID
$(NA$,Z,1)):IFZ1>96 THEN Z1=Z1-9
```

```
6 ELSE IFZ1>31 AND Z1<64 THENZ1=
Z1+64
330 L=&H7EFF+Z:POKE L,Z1:NEXT
340 '*** MAIN MENU ***
350 PRINT:PRINT"MAIN MENU":PRINT
:PRINT"[1] Toggle Chat flag":PRI
NT"[2] Toggle Clock display":PRI
NT"[3] Toggle String display":PR
INT"[4] Toggle Inverse":PRINT"[5
] Change Clock speed"
351 PRINT"[6] Log off":PRINT
360 GOTO2000' CHECK TIME LEFT
400 PRINT:PRINT"Enter choice>> "
;:LINEINPUTZ$:Z=VAL(Z$)
410 IFZ$="?"THEN350
420 IFZ=1 AND PEEK(&H7F22)=0 THE
N POKE&H7F22,1:PRINT"Chat flag o
n!":GOTO350 ELSE IFZ=1 THEN POKE
&H7F22,0:PRINT"Chat flag off!":G
OTO350
430 IFZ=2 AND PEEK(&H7F20)=0 THE
NPOKE&H7F20,1:GOSUB2100:PRINT:PR
INT"CLOCK DISPLAY OFF":GOSUB2200
:GOSUB2150:GOTO350 ELSE IF Z=2 A
ND PEEK(&H7F20)=1THENPOKE&H7F20,
0:GOSUB2100:PRINT:PRINT"CLOCK DI
SPLAY ON":GOSUB2200:GOSUB2150:GO
TO350
440 IFZ=3 AND PEEK(&H7F21)=1THEN
POKE&H7F21,0:GOSUB2100:PRINT:PRI
NT"STRING DISPLAY OFF":GOSUB2200
:GOSUB2150:GOTO350 ELSE IFZ=3THE
NPOKE&H7F21,1:GOSUB2100:PRINT:PR
INT"STRING DISPLAY ON":GOSUB2200
:GOSUB2150:GOTO350
450 IFZ=4THENGOSUB2100:GOSUB3000
:GOSUB2150:GOTO350
460 IFZ=5THENP=PEEK(&H7F23):PRIN
T"Current clock speed"P:PRINT"Th
e larger the number, the slower
the clock.":PRINT"Enter new cloc
k speed ";:LINEINPUTA$:P=VAL(A$)
:POKE&H7F23,P:PRINT"Clock now at
"P:GOTO350
470 IFZ=6THENPRINT"BYE!!":MOTORO
FF:FORZ=1TO2000:NEXT:GOSUB3100:G
OTO200
500 PRINT"HUH??":GOTO350
1000 '*** SET UP 40 AND 80 COL S
CREENS IF COCO 3 ***
1010 POKE&HE03D,PEEK(&HE03D) OR
&H20:POKE&HE046,PEEK(&HE046) OR
&H20:POKE&HF8F4,&H19'THESE POKES
 SET UP SCROLL AND CLS PROTECTED
 AREA ON 40 AND 80 COL SCREENS
1020 WIDTH80:PALETTE8,48:PALETTE
4,0:PALETTE1,0:CLS2'SET BLACK BA
CKGROUND WITH BUFF LETTERS
1030 LOCATE0,24:ATTR0,2:PRINT:AT
TR0,1'CLEAR SCROLL PROTECTED ARE
A ON 80 COLUMN SCREEN
1040 POKE&H415,96'PUT A SPACE BE
TWEEN STRING AND CLOCK ON 32 COL
 SCREEN
1050 WIDTH32:CLS(2):RETURN
2000 ' *** CHECK TIME LEFT ***
2010 T=PEEK(&H7F1E):IFT=0 THENPR
INT"Time limit is up!":GOTO200
2015 PRINTPEEK(&H7F1D)"day(s) ha
ve elapsed."
2020 PRINTT"minutes left":GOTO40
0
2100 '*** SEE IF COCO 3 ***
2110 IFC$="Y"THENWIDTH32:RETURN
ELSE RETURN
2150 IFC$="Y"THENWIDTH80:RETURN
ELSE RETURN
2200 LINEINPUT"HIT ENTER TO CONT
INUE";A$:RETURN
3000 PRINT:PRINT"Q TO QUIT OR AN
Y KEY TO TOGGLE"
3010 Z$=INKEY$:IFZ$=""THEN3010
3020 IFZ$="Q"THENRETURN
3030 IF PEEK(&H7FD5)=48THENPOKE&
H7FD5,112 ELSE POKE&H7FD5,48
3040 GOTO3010
3100 IFC$="Y"THENWIDTH32:CLS(2)
3110 POKE&H7F20,1:PRINT:RETURN
```

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ML Tutorial Pt. 3A, 3B
ML Tutorial Pt. 4
ML Tutorial Pt. 5
ML Tutorial Pt. 6
ML Tutorial Pt. 7
ML Tutorial Pt. 8
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Coco Technical Look
Coco Technical Look Pts. 1-3

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Clown Dunk Math

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Flippy The Seal
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Panzer
Mrs. Pac
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Cosmic Rays
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Battle Tank
Kron
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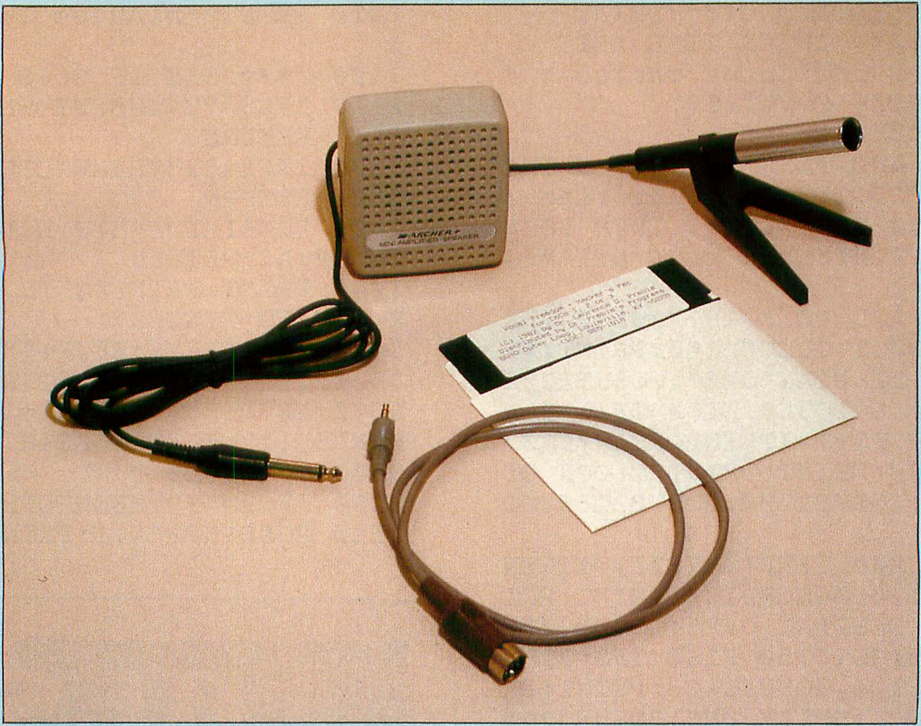


Software/Hardware CoCo 1, 2 & 3

Vocal Freedom — CoCo Claims the First Amendment!

Imagine coming home one day and calling out, "Hello, is anyone home?" as usual. Suddenly, your best friend's voice answers, "Hi, I am speaking to you from inside your Color Computer! I decided to do a little experimenting, and I must have done something wrong, because here I am inside!"

Then you hear your dog barking and your friend telling him to be quiet. You're beginning to be more than a little curious, because it really *does* sound like your friend's and your dog's voice coming from a machine. You go into the next room and see your beloved Color Computer on. Just as you clear the door it says, "I know this is a little hard to believe, but it's really my voice talking to you, and I'm getting kind of hungry, so I want to come out. You better not shut the computer off, or I might disappear forever!"

Well, the barely controlled giggling from the closet indicates that your friend is not *really* in the computer, and Fido's wagging tail reassures you that he's OK, too. But you *have* to know — what is this amazing new device that makes your CoCo sound exactly like your best friend? You don't have long to wait, for soon the numbers on the display stop moving, the screen flashes red and a stranger's voice says, "*Vocal Freedom* is ready!"

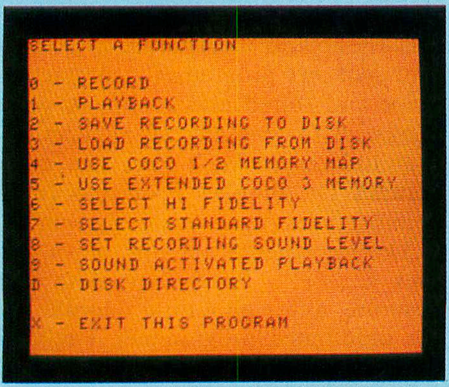
Imagine being able to write a program in BASIC and include sound effects like the whine of a jet fighter plane or the plunk of a piano. Or even a person talking and laughing or singing. Imagine the capability for a myriad of sound effects and human voices loaded into memory from file after file and played back at different speeds or in different orders, or all at once. And this is no cheap imitation — this is the real thing; whatever it is that the computer has heard, it will reproduce.

OK, you say, what is this amazing device, this *Vocal Freedom*? It's a software/hardware package from Dr. Preble's Programs that turns the Color Computer into a digital voice recorder (DVR). DVR is the same recording principle used in compact disc players.

Vocal Freedom runs on the CoCo 1, 2 or 3 with at least one disk drive. In addition to the DVR program, you can also buy a companion program called *Vocal Freedom Hacker's Pac*, which consists of a "programmers toolkit" for special effects used in conjunction with two demonstration programs (one for a 64K CoCo and the other for a 512K CoCo 3).

In addition to the disk and documentation, you also receive a special cable that connects between the right joystick port and an amplifier. Amplifier, you ask? Yes, a small mini speaker/amplifier is required to run *Vocal Freedom*, along with any simple dynamic or electret microphone (like you'd find in a portable tape recorder). The amplifier and microphone are not included in the package, so you'll need to buy them separately. Both are available from Radio Shack. The amplifier (Cat. No. 277-1008), which costs $11.95, is a battery-operated audio amplifier with a built-in speaker.

The microphone can be any one of many different kinds. Radio Shack also sells these, starting at $18. As long as it will plug into the miniature phone jack on the speaker/amplifier, it will work. I recommend the Radio Shack 200-ohm dynamic microphone. It is inexpensive, but effective. If you are going to be getting serious with this product, naturally you are going to want a better amplifier and microphone. And if you have a CoCo 3 or a monitor driver on an older CoCo, you will be able to redirect the sound output to high-quality speakers instead of the TV or monitor speaker.



```
SELECT A FUNCTION

0 - RECORD
1 - PLAYBACK
2 - SAVE RECORDING TO DISK
3 - LOAD RECORDING FROM DISK
4 - USE COCO 1/2 MEMORY MAP
5 - USE EXTENDED COCO 3 MEMORY
6 - SELECT HI FIDELITY
7 - SELECT STANDARD FIDELITY
8 - SET RECORDING SOUND LEVEL
9 - SOUND ACTIVATED PLAYBACK
D - DISK DIRECTORY

X - EXIT THIS PROGRAM
```

Vocal Freedom gives you many different options, which are presented in the form of a main menu. The program always returns to the main menu after it has completed a task for you. There are several allowances for using the CoCo 1 and 2 within the framework of this menu structure. One is an option that lets you use the CoCo 1 and 2 memory map. There is also an option that allows the use of the CoCo 3 extended memory map. Basically, the more memory you have, the more recording time you have.

Another option lets you use the high-speed or high-fidelity mode. This is not just a feature for CoCo 3 users, though, as one might expect; many of the older CoCos are capable of the high-speed mode. I tested an older CoCo 2, and it ran in high speed just fine. This feature makes the 6809 CPU chip run at twice normal speed. It is called "high-fidelity" because it allows the computer to sample input at a rate of 8,000 times a second instead of 4,000. This is an important feature, because it makes for a significant difference in quality on playback.

High-fidelity is a must for quality sound reproduction. While Dr. Preble notes in the manual that 4,000 ADC (analog-to-digital conversions) per second is adequate to recognize speech, anyone with the high-fidelity capability in the CoCo would very likely not want to use the low-speed mode. Remember that each sample uses a byte of memory, so memory will get eaten up twice as fast in high-speed mode. This still allows for several contiguous minutes of speech in memory at a time.

Another important thing to remember, however, is that if you fill up 512K of memory with sound and want to save it, you have to have 512K of disk space to put it on! Either that or you must create small files using the CoCo 1 and 2 memory map option. For programmers who might want to include speech or sound in their programs, the 64K files would be a must.

Besides the regular playback mode, there are two other important features of *Vocal Freedom* you should know about. First is the voice-activated playback option. If you select this mode, CoCo will instantly play back anything stored in memory when it hears a noise in the room. (Note the opening lines of this review as an example of this exciting feature.)

The second important feature is the option that lets you set the sound recording level. This option allows users to set the level of their amplifiers for optimum sound recording accuracy. This is accomplished by the computer requesting that you speak into the microphone repeatedly and then adjust the volume control.

After six adjustments or more the computer will inform you that the

What is Digital Voice Recording?

Vocal Freedom and *Hacker's Pac* are more than just run-of-the-mill programs for the CoCo 1, 2 and 3. They comprise a sophisticated software package that includes a digital voice recording program and a set of machine language programs to utilize the power behind the system. What *is* digital voice recording?

Imagine if you will that the computer sees your voice as electrical charges after it is input from an amplified microphone. These charges are sampled or read by the computer either 4,000 times per second in slow mode or more than 8,000 times per second on a high-speed CoCo 3. That's an awful lot of reading to remember! This process has a name — analog-to-digital conversion.

In this process, an actual number value, such as the number of millivolts in a frequency, is converted into a number that the computer understands, a number composed of ones and zeros — a binary number. When data is presented in binary format, the computer can make sense of what it is seeing and hearing.

In order to reproduce what it has seen and heard in a human-understandable format, the computer must take all the numbers it has recorded and convert them back into the actual frequencies they represent, then send them to a speaker like the one in your monitor or TV set.

Dr. Preble suggests in his manual that you think of DVR as a series of snapshots the computer takes and arranges almost like a connect-the-dots picture. The more dots there are, the closer together, the more realistic the "vocal picture" will look when the computer recreates exactly what it has recorded.

This is the same principle at work with compact disc players. CD players sample a sound 40,000 times a second, though, which is 10 times faster than the average CoCo can, and which is why some CD players sound so realistic. They can play back a very accurate reproduction of the frequencies they have heard. ☐

The Amazing Dr. Preble and his Programs

Like so many other companies in the Color Computer Community, Dr. Preble's Programs has some fascinating and humble roots indeed. The CoCo Community has been supported largely by America's "cottage industry," which is best characterized by hobbyists with entrepreneurial designs inventing something on the dining room table in hot pursuit of what no one else has done before.

Before they know it, there is interest in their breakthrough. Then they create a little company, buy a little advertising in a trade journal, and pretty soon — a star is born. Apple's famous Steve Jobs is a prime example of this. So is Dr. Preble's Programs, and here is that story . . . .

In 1969, there were very few computers around, and most of them filled up large rooms and were owned and operated by the military. Laurence Preble, then an aspiring hobbyist, built for himself a microcomputer from a kit sold by Southwest Tech.

The kit was a 6809-based computer with about 4K of memory, although it was soon upgraded to 24K. Its next upgrade was to 56K, and that is what it has right now — Dr. Preble is still using that computer, having it perform patient functions in his professional chiropractic office. It stores information on 8-inch Qume drives, also from a bygone era, and has a speech synthesizer attached to it.

Dr. Preble's Programs actually began in 1978 when he wrote a program in 6809 machine code and advertised it in the then fledgling *Computer Shopper* magazine. The program was called *Fast Sort*. Shortly thereafter, Dr. Preble became interested in speech synthesis and built his own hardware kit, programming speech phonemes (the actual elements of sound that go together to create speech) into the 6809 computer by hand. Two great and wonderful things occurred next. First, a company called Votrax developed a speech synthesis chip called the SC02, and second, Tandy invented the Color Computer.

Dr. Preble was a hardware hacker through-and-through and could not resist the temptation of this $600-plus machine with its wonderful graphics and exciting sound capabilities. He immediately purchased one and began to work diligently with it. His next hurdle was in 1983 when he wanted to obtain a disk drive; it, too, was in the $600-plus price range.

Instead, he determined to utilize the upper memory bank in his CoCo to work as a fast disk drive by storing programs there in a slightly compressed format. To that end, Dr. Preble wrote a program to utilize the unused areas of the CoCo's memory. The program was called *VDOS*, and it helped to boost Dr. Preble's Programs into the ranks of the dedicated contributors to a rapidly growing CoCo Community.

A veteran RAINBOWfest exhibitor, Dr. Preble continued developing programs for the Color Computer from his well-spring of a truly unique background. One of Dr. Preble's CoCos is now utilizing *Vocal Freedom*'s speech recognition capability and the program *Ears* from Speech Systems (along with a variety of other devices) to run his burglar alarm — and also to open doors, turn on lights and run the intercom system in his house!

As a chiropractor, Dr. Preble studied biofeedback. After completing some work with electrobiometers and galvanic skin response sensing, he took an eclectic approach toward curing patients who were suffering from back pain. He then wrote *Mental Freedom*, a fascinating video game program that reacts to a person's level of stress by using the computer to measure galvanic skin response.

In addition to his private practice as a chiropractor, Dr. Preble is a private pilot and uses his Tandy Model 100 computer for flight planning. He also has the distinct pleasure of having taught our beloved editor and publisher, Lonnie Falk, how to fly.

Dr. Preble said he is very committed to serving the CoCo Community in the months and years to come. He remains fascinated by the impressive and flexible Color Computer and is looking forward to developing ever newer and more innovative software for it. ☐

sound recording level is correctly set. This is important because if the recording level is set low, the computer will not hear you or will fade in and out and miss words. Conversely, if the volume is set too loud on the amplifier, you can overdrive the recording level and produce very distorted and garbled results. Careful attention to this feature is a necessity!

The documentation that accompanies *Vocal Freedom* is complete and easy to follow. It explains what the computer is doing to turn itself into a digital voice recorder in terms virtually anyone can understand. In fact, this sophisticated program could hardly be any easier to operate. The connections to the amplifier and microphone are very straightforward, and the main menu allows for simple operation. Very shortly after you turn it on for the first time, you will be using it like an expert.

Hacker's Pac

Hacker's Pac is a software package you can purchase as a separate add-on option to *Vocal Freedom*. It is written in machine language utilizing BASIC subroutines. The subroutines themselves are stored on the disk as separate files to make it easy to merge them into your own programs; they are designed to allow the user to load, save, change speed and memory location, and play DVR files created by *Vocal Freedom*.

Hacker's Pac is an excellent tool for extrapolating the uses of *Vocal Freedom* and pushing the product to its utmost capabilities. With this program and its built-in subroutines, recording after recording can be loaded from disk files and stored in memory or switched in and out of memory locations.

One of the best features of *Hacker's Pac* is that it is position code independent, which means that it can be placed anywhere in the computer's memory (as long as it does not interfere with something else already in memory). This is useful when you want to tuck the module out of the way and utilize every last bit of available RAM.

Although a little intimidating at first for the novice programmer, *Hacker's Pac* comes with two demonstration programs by way of an online tutorial. It is extremely easy to use, allowing you to merge *Hacker's Pac* subroutines into programs you write. These demonstration programs really help you learn quickly how to incorporate DVR files into your own programs for spectacular voice and sound effects. If you write programs for commercial applications that utilize *Hacker's Pac*, you must contact Dr. Preble's Programs for a commercial software license agreement.

The documentation that accompanies *Hacker's Pac* is complete and accurate, although a little rigorous for the uninitiated programmer. I recommend the "grabbing the bull by the horns" approach in this case; once you begin to use (and enjoy!) *Hacker's Pac*, you will see how versatile and easy to use it is.

If you are going to purchase or have already bought *Vocal Freedom*, *Hacker's Pac* is a must if you plan to go beyond simple recording and playback into the sophisticated areas of memory bank switching, speed setting, multiple file loads and saves, etc. As a "programmers toolkit," this software is worth every penny and will stretch *Vocal Freedom* to the maximum.

Hear Ye, Hear Ye!

With *Vocal Freedom* you get an amazingly powerful package with few trouble spots. None of the problems I encountered were either substantial or show-stoppers — with one exception: The documentation does not specify filename format when the machine prompts you for loading or saving files.

The version I used worked when the filename was typed without quotes and without its `.DVR` extension, in most cases. However, unless I answered with a correct filename at this load or save prompt, the program would crash and have to be restarted. Also, there is no warning when you run out of disk space — you just get tossed back to the main screen with the fate of your file in limbo. Here also the documentation assumes that nothing will go wrong. If something *does* go wrong that you cannot handle on your own, you can call Dr. Preble's Programs for assistance. There is a 24-hour hotline.

Vocal Freedom and *Hacker's Pac*, while being a little expensive when you add in the cost of the amplifier and microphone, are well worth the investment. This is a real, working digital voice recording system that could have numerous applications from interactive education to entertainment to working with blind people who want to learn about computers. Its potential for special effects makes this an excellent value and an important volume in the CoCo software library.

Vocal Freedom is a full-featured and sophisticated program made even more powerful by its companion, *Hacker's Pac*. In spite of a few minor problems, the programs are really quite versatile and well-programmed. I can recommend this package to anyone without hesitation. If the idea of digital voice and sound recording intrigues you, *Vocal Freedom* could be the program you've been waiting for!

(Dr. Preble's Programs, 6540 Outer Loop, Louisville, KY 40228, 502-969-1818; *Vocal Freedom*, $34.95; *Hacker's Pac*, $14.95; add $2.50 S/H)

— Jeffrey S. Parker

Software CoCo 1, 2 & 3

BASIC Utility Diskette — Utilities for the BASIC Programmer

The *BASIC Utility Diskette* from T.E.M. of California is a collection of five programs to assist the software developer in writing and debugging BASIC programs. The disk also includes a compiled version of two of the programs to increase the processing speed for large files. The utilities require a CoCo 1, 2 or 3 with at least 64K, one disk drive and a printer.

The five utilities consist of the following programs: `COMPARE.BAS`, `CROSSREF.BAS`, `DUMPCRT.BAS`, `DUMPDIR.BAS` and `DUMPFILE.BAS`. Patches are provided for each of the programs, so you may customize them for your particular hardware. This allows you to bypass the initial questions about which CoCo you are using and how many drives you may have.

The first utility, `COMPARE.BAS`, comes with a compiled version, which is loaded by a BASIC program called `COMP.BAS`. Both perform a line-by-line comparison of two BASIC programs, which may be saved in either ASCII or binary format as long as both files are in the same format. The lines that differ will be output to the printer (you can elect to have the entire line printed or just the line numbers).

The compiled version requires that you leave the disk in the drive, because it loads program code as required. Single-drive users are required to copy the utility programs onto the same disk as the programs being compared. This utility makes it very simple to locate minor changes between program versions. The manual includes instructions for handling versions with line numbering offset by the `RENUM` command.

The `CROSSREF.BAS` utility can be used only on BASIC programs saved in binary format. This utility provides a numerical listing of all jump instructions (i.e., `GOTO`, `GOSUB`, etc.) in a program. It requires the use of temporary storage space on your disk; therefore, there must be space available and no write-protect tab. The space is released upon normal completion of the program. Halting the program during execution will not release the disk space used: You must run the program again and allow it to complete normally to release the space. The output produced is a listing of line numbers called and from where they are called.

The `DUMPCRT.BAS` utility includes three versions. One is for standard 32-by-16 text displays, one is for 40-by-24, and the other is for 80-by-24. Of course, the last two are only for the CoCo 3. According to the instructions, the primary use of this program would be to print the screen display of the `TRON` (trace on) command. `DUMPCRT` may be executed directly from the keyboard or embedded within the program being traced using the `TROFF` (trace off) and `RUN` commands. Small sections of code may be traced and debugged in this manner. You must select the proper locations to embed the `DUMPCRT` command so your trace will not scroll off the screen before being printed.

The `DUMPDIR.BAS` program is mainly to assist in keeping track of the programs on your disks. It produces a printed listing of the files on a disk that may be trimmed to fit into a disk jacket for reference. The information includes a disk name and date, filename, extension, type, indication of binary or ASCII format, number of granules, number of sectors, and amount of free space remaining — a very handy program, indeed.

The last utility is `DUMPFILE.BAS`. This utility may be used with programs written in BASIC and saved in either ASCII or binary format, as well as with machine language programs. A printed copy of the disk file is produced in either decimal or hexadecimal form. The number of sectors in the file is determined, and you may dump any range of sectors. The listing contains 20 bytes per line and 256 bytes per sector.

Two of the demo programs provided on the disk are also useful utilities. One produces a sorted directory listing on the screen, and the other converts either a decimal or a hexadecimal number to binary.

All of the programs worked flawlessly and were accompanied by a 32-page manual. I tested several different BASIC programs and one machine language program as well as the demos provided. The `CROSSREF` program even found a syntax error (an extra quote mark) in something I had typed. Programmers who do much work in BASIC would do well to include the *BASIC Utility Diskette* in their utility library.

(T.E.M. of California, Box 4311, Fullerton, CA 92634, 714-871-8210; $19.95 plus $2 S/H)

— Larry Birkenfeld

Software CoCo 3

Castle of Tharoggad — To Slay an Evil Wizard

The good wizard who ruled the kingdom of Tharoggad has been abducted and imprisoned by his evil brother. You, the superhero of the land, must go into the castle and rescue him. But beware: There are traps to avoid and giant spiders, snakes, ghosts and bats that you must do battle with, using weapons found along the way.

Castle of Tharoggad is a maze Adventure game supplied on a ROM pack for the CoCo 3. The game has seven levels, and you start out on the ground floor carrying nothing but a backpack that contains a torch. You will need a joystick or mouse and either a TV or RGB monitor. The package includes an 11-page booklet that provides adequate instruction on game play.

Castle of Tharoggad is icon- and menu-driven. The lower half of the game screen consists of the icons, which represent your options. In the center of the collection of icons is a beating heart — yours. The speed with which the heart beats is determined by how much you exert yourself moving around and battling creatures. The slower the heart beats, the healthier you are and the more likely you will defeat the creatures. On the other hand, the faster it beats the more likely you will lose the battle.

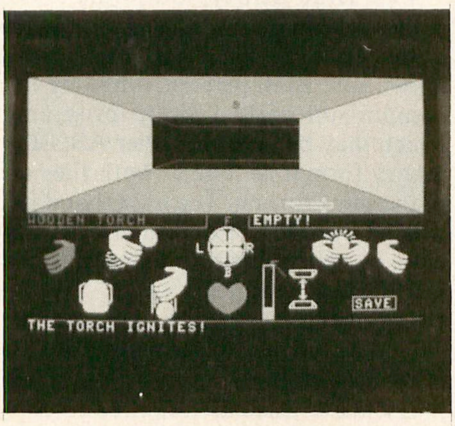
Just above the heart is a compass you point and click to move around the maze. There is also a game save icon — this feature is a must! The game save consists of four codes of nine letters and numbers. Other icons include left and right hands, a backpack in which to store inventory, "grab" and "drop" icons, an "incant" icon, and "trap door" icons to reach the levels above and below.

To pick up an object, you point to either the left or right hand and then to "grab." To pull something out of the backpack, you point to the backpack and then to a hand. To attack one of the verminous creatures that never leave you alone, you double-click on either the left or right hand icon. Castle inhabitants will also pick up objects — sometimes objects that you'll need later in the game. However, when you kill a creature it drops whatever it's carrying.

The graphics occupy the upper half of the screen — the maze with the creatures, weapons and traps. You'll see all this, that is, after you figure out how to make your torch work. The graphics, though animated, are not what you would expect from a CoCo 3 game. In fact, I have seen better graphics on CoCo 2 games. It's hard to feel heroic when you're slaying a blue spider that wears a silly grin on its face.

Also, the joystick response sometimes becomes very sluggish during battle, which can be frustrating. To be honest, the whole game is a little slow.

Until you collect a certain number of objects, which involves killing a number of creatures, you cannot find the doorway to the next level. At times the creatures would attack in twos or threes, regardless of whether I stayed still or moved around. Other times I could find no creatures, weapons or door to the next level for long periods of time.



THE TORCH IGNITES!

I feel that if *Castle of Tharoggad* had better graphics and more action it would be more appealing. But if you're a video Adventurer who is persistent and does not mind if a game is a tad slow, *Castle of Tharoggad* could be a game for you.

(Tandy Corporation, Fort Worth, TX; $29.95: Available in Radio Shack stores nationwide)

— Steve Griffith

Software 512K & OS-9 Level II

OS-9 Level II BBS — Put Your Own Board Online

One of the most entertaining aspects of the computer hobby is telecommunications. Many of us use our CoCos to communicate with Delphi and CompuServe as well as with friends both near and far. As you sit at the keyboard browsing through the myriad of databases on these systems, you might think it would be neat to operate such a system yourself, admittedly on a much-reduced scale.

There are programs in the Disk BASIC world that let you start and operate a BBS. *CoBBS* (THE RAINBOW, November 1985, Page 135) is one of them. Now those of us in the OS-9 realm have the same opportunities with the introduction of *OS-9 Level II BBS*.

OS-9 Level II BBS is not a single, large bulletin board program — in the spirit of OS-9, it is a set of utilities and commands used to create and run the board. In addition to the software, you will need an auto-answer modem and 512K of memory.

Rather than discuss all the components, I think the following will best illustrate the package:

Command	Function
`tsmon`	autobaud terminal monitor
`login`	user log-in manager
`monitor`	carrier-detect monitor
`menu`	menu manager
`BBS.build`	simple file creator
`BBS.chat`	chat with SysOp
`Answer`	answers request to talk with SysOp
`BBS.create`	creates message base
`BBS.post`	posts a message to the board
`BBS.delete`	deletes a message
`BBS.pack`	packs messages after deletion (conserves disk space)
`BBS.read`	reads messages
`BBS.forward`	reads forward beginning with a specified message number

`BBS.new`	reads all new messages since last access
`BBS.scan`	lists headers of all messages in the message base
`BBS.search`	keyword search of message
`BBS.mail.post`	posts mail
`BBS.mail.check`	checks to see if previously sent mail has been received
`BBS.mail.read`	reads mail
`BBS.mail.readd`	deletes mail
`BBS.upload`	provides capability to upload files to the BBS using either standard Xmodem, CRC Xmodem and Ymodem
`BBS.download`	provides the same transfer options to download files
`BBS.conf`	enters conference with another user
`BBS.conf.who`	informs user who is on the system

As you can see, all the basics of a bulletin board are present, including the standard functions for operating the usual message databases as well as three protocols for uploading and downloading files and programs. Not mentioned in this list are SysOp utilities and utilities for maintaining the download section of the board. The program provides a command that allows the SysOp to validate uploads and add a one-line description, a list of keywords and a paragraph description. This information is available to users wishing to download a file.

The *OS-9 Level II BBS* package also comes with the utilities `TSMon`, `Login`, `Monitor` and a menu program. `TSMon` is the time-share monitor, which is similar to `TSMon` provided by Tandy in its Development Package. This is an autobaud version in that it adjusts to the standard baud rates between 300 and 2400. Once `TSMon` opens communication, it runs `Login` and `Monitor`. `Monitor` simply monitors the carrier detect signal from the modem. When this signal is lost, `Monitor` kills all processes started by the user so that a new user can log in. `Login` provides just what you would expect — it requests the user's ID and password and then validates the user and runs the menu program. This is the standard and usual way of running the board; however, the SysOp can choose to give a particular user access to the shell.

> ***"Installing the bulletin board is quite easy since an installation shell script comes with the package."***

The menu program is quite useful in its own right, providing a way to add new options to the BBS. Two files are read by the menu command. The first file is the menu itself. The second file is the command file, which is a list of single-letter options and the command

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(SINCE 1985)

to be executed for that option. The following should illustrate how `Menu` operates.

Menu File	**Command File**
L List files	L `Dirdownloads`
U Upload file	U `Uloadx`
D Download file	D `Dloadx`
M Main menu	M `Chd /dd/BBS`

All OS-9 commands and special characters are valid on the command lines of the file. The neat thing about the `Menu` command is that a change directory command will cause `Menu` to read the menu and command files in the new directory. This is accomplished by using the same filenames for these files in each directory, e.g., `bbs.menu` and `bbs.cmds`. These files are text files and can be created by your favorite editor.

Installing the bulletin board is quite easy since an installation shell script comes with the package; this consists of two disks that contain the various programs and a complete BBS ready to run. In other words, all of the menu and command files have been set up. `Install` creates all the necessary directories and copies the menus and files. This is very useful for those with hard disks or floppy drives other than the standard single-sided 35-track drive, which the software comes on.

A very nice feature of *OS-9 Level II BBS* is an option in the `TSMon` command that allows you to run the BBS in a window for debugging. It's really neat to have the board running in Window 1, *DynaStar* in Window 2 and utilities in Window 3 as you begin the process of customizing the board. In this way you can make changes and see the immediate result by flipping to the BBS window.

Although the primary purpose of the *OS-9 Level II BBS* is to run a bulletin board system, there are several other uses for the software. As I noted above, the board will run in a window — it could be set up as a family message center.

If you transfer public domain programs with others, you can eliminate the need for two people to have to set up terminal programs. Rather, set up the BBS — at least one person is free to go on and do other things with the CoCo. As you would expect for a multitasking system, you can perform other tasks while the BBS is running — even on a floppy system. *OS-9 Level II BBS* was tested on a floppy disk-based system and performed just fine. Obviously, a hard disk will greatly improve system performance.

The `Menu` program, which actually controls the BBS, is a very useful program in other ways. It can be used (especially on a hard disk) to better manage the use of the computer, i.e., make OS-9 more user-friendly by setting up menus and command files in each directory and letting `Menu` control the movement about the system.

Although I don't have the time to run and maintain a BBS, *OS-9 Level II BBS* is an excellent package for those who do. It is nicely done, especially with the operational BBS included. The ability to customize the BBS to your own liking is an added feature. And the additional use of some of the utilities beyond the BBS make this package especially attractive.

One precaution independent of the software is to make sure that the cable between computer and modem carries the DTR and carrier-detect lines. These lines are necessary and are sometimes not connected in some cables (I learned about this the hard way!).

(Alpha Software Technologies, 2810 Buffon St., Chalmette, LA 70043, 504-279-1653; $19.95.)

— Donald Dollberg

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Book

DELPHI: The Official Guide — Off-Line Help for Online Operations

Like the intrepid native guides that lead expeditions up the Amazon, *DELPHI: The Official Guide* will lead you through the vast jungle of information offered on the Delphi computer information network. If you, like me, find the service easy to use, but the quantity of information offered bewildering, then this book is for you.

Even though Delphi has a very complete online help library, the ultimate help utility is this book. Written with the new user in mind, *The Guide* will be of benefit to most Delphi subscribers — especially when trying something for the first time.

> ***"The reader is guided through virtually every menu the service offers and is provided detailed explanations of what each choice from every menu will yield."***

The book begins with a section called "Getting Started." In simple language, using a minimum of jargon, the section gives you instructions on how to set up your terminal software to communicate with Delphi, how to sign up on Delphi, and how to tell either Tymnet, Telenet or Datapac that you want to be connected to Delphi. From there you go into a discussion of important commands and how to answer questions in a way that the service understands.

The next few chapters are filled with descriptions of services and options available. Did you know that Delphi has a mortgage calculator online? That's just one of the services you can find out about in the book. I doubt most users would ever discover all the neat things on Delphi by themselves. With *The Guide*, it's all laid out in black-and-white for you to study off-line.

The reader is guided through virtually every menu the service offers and is provided detailed explanations of what each choice from every menu will yield. This alone justifies the price of the book. I have spent a great deal of time online searching through the various menus, looking for a particular service I'd seen somewhere but was unable to find again. Now I just look it up in *The Guide*'s index, and there I am — without having to press CTRL-Z even once.

The chapter covering online Workspace proved to be the most helpful to me. Workspace is a versatile feature with a very cryptic way of operating (at least to me). After reading *The Guide* I still find the Workspace to be cryptic, but now I can get around in it and do some tricks I had not even suspected were possible. *The Guide* gives concise instructions and clear examples on how to do most anything you can think of with the files in your Workspace.

The Guide contains more than 480 pages with almost 100 pages of references, indexes and appendices. There is also a three-page, front-and-back pullout that lists all the commands and menu options.

DELPHI: The Official Guide seems to be as complete a reference as you will ever need. If you use Delphi often, *The Guide* will eventually pay for itself — you'll save on the connect fee usually spent reading through help screens. You can look up any information you need — off-line. Besides, reading *DELPHI: The Official Guide* will give you something to do while waiting for the evening hours when you can afford to get online.

(Simon & Schuster, 1 Gulf+Western Plaza, New York, NY 10023, 212-373-8142; $21.95)

— David Horrar

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Software CoCo 1, 2 & 3

Video Draw Poker — Five-Card Simulation

According to its author, *Video Draw Poker* was developed to simulate the video poker machines found in casinos. (Depending on where you live, they may also be found in local clubs and bars.)

Usually for a minimum of a quarter, the machine deals you five cards. After the deal you may replace some or all of the cards. If your new poker hand then meets the requirements for one of the payoffs, you are either paid off or credited with additional plays.

Unlike real slot machines, winning and losing is not totally a random event — your choice of which cards you keep and which you discard does affect your likelihood of winning. (Unfortunately, however, even if you make the best possible move, the odds, like the odds on slot machines, are still stacked against you.)

Video Draw Poker works on two levels — you can play the game for nothing and, perhaps more importantly, you can test various playing strategies.

The simulation comes on tape or disk and requires a minimum of 32K. I tested the disk version. From a simple menu, your choices are playing, testing or quitting. If you choose to play, you will be asked how much money you want to start with. Once you are staked, you can bet from $1 to $5 on a hand as long as you have money.

Once you have made your bet, five cards are dealt. (The graphics are relatively simple — the purpose of this simple program is not to dazzle your friends.) You then choose your discards and the computer replaces them. If your hand meets a payoff level, your winnings are added to your stake. Play continues until you either run out of money, quit or decide to test a playing strategy.

I found the strategy-testing part of this simulation to be its most interesting and valuable feature. The program allows you to set up a hand — you decide which five cards you initially receive, which you will discard, what your initial stake is and how much each hand is worth.

When the simulation is set up, the computer will then randomly play this same hand as many times as you want it to — all the while keeping a running total of your stake. For example, suppose that you are dealt a four, five, seven, eight (each of different suits) and an ace of diamonds. Do you throw away the ace and hope to draw a six (completing your "inside straight") or do you discard everything but the ace, figuring that drawing four cards will give you more possible ways of winning?

> ***"What should I do if three of the cards, including the ace, are diamonds? If four of them are diamonds? With this simulation, I can find the best strategy."***

Figuring the odds of drawing the straight are fairly easy — there are four sixes in the remaining 47 cards. Therefore, I have four chances in 47 of drawing a straight that will give me back $4 for my dollar wagered. (Note that a six is the only card that will win for me.)

The second possibility is not as easy to figure. With four cards, I could match my ace, pair other cards, get a straight, flush, full house, or even a royal flush. The possibilities are measurable but not nearly as easy to figure.

Which is the better play? I could consult my old statistics textbook or I could allow the computer to play each hand perhaps 5,000 times. The answer would most likely be the same. The beauty of this simulation is that it allows us to check various strategies. What should I do if three of the cards, including the ace, are diamonds? If four of them are diamonds? With this simulation, I can find the best strategy.

In his easy-to-understand documentation, the author lists four uses for his program: fun, testing strategies, practice, and deciding "if you want to do real gambling on this type of machine." Interestingly, the conclusion for the final use comes after you've done the other three. The program is fun, and it allows you to practice all kinds of strategies. But it still wins even when you use the best of strategies. If you are interested in video poker, you should check into this program.

(Prometheus Software, P.O. Box 15859, Long Beach, CA 90815; $17)

— John Matviko

Software CoCo 3

V-Term — CoCo 3 Terminal Emulation

Whether you are going online for the first time or just looking for a terminal program that is a little more versatile than the one you are presently using, I don't think your search will be over until you have purchased a copy of *V-Term*. This is probably one of the most versatile and full-featured terminal emulators I have seen for the CoCo 3.

One of the first things I noticed upon opening the package was the well-written and professional-looking manual, which contains 56 pages of information that will have you online in no time. It even includes a section called "An Introduction to Data Communications," which should help even the novice to understand exactly how modems and terminal programs work together to allow communication with other systems.

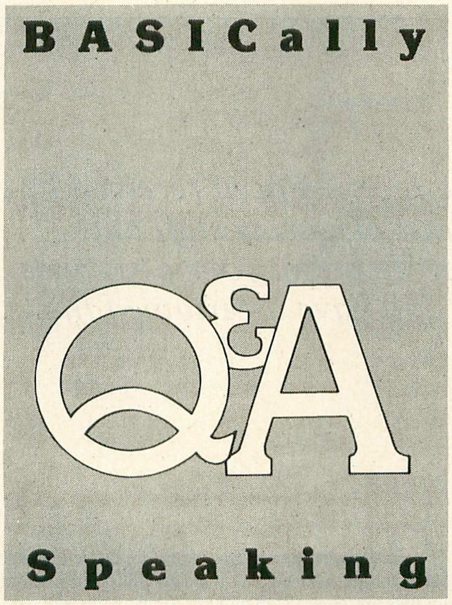
I feel I should mention the quality of the manual because, in my opinion, even the best program is worthless if it is not supported by the proper documentation. Believe me, *V-Term*'s manual leaves few questions unanswered.

Another thing I am happy to report is that *V-Term* is supplied on an unprotected disk, so you can make a backup.

When I loaded *V-Term*, it autoexecuted and I was greeted with the start-up screen. It was a 28-line screen of which the bottom three lines were reserved for the onscreen menu. Using the ALT and arrow keys I was able to select from the menu options, which usually presented me with a submenu.

The first choice I made was to select the option Parameter from the main menu. From here I was able to change the RS-232 rate, the transfer protocol I wanted for uploading/downloading files, printer settings, and even screen color. I was able to save these and other options to disk — every time I boot *V-Term* it's configured exactly the way I like it. Still not impressed?

Another option from the Parameter menu is Terminal, which allows you to choose from the four types of terminals *V-Term* can emulate: VT-100, VT-52, Vidtex and CRT. If you subscribe to CompuServe, something you may find of special interest is that *V-Term*'s



By Bill Bernico
Rainbow Contributing Editor

If you are working on a BASIC program that has you stumped, write in to Bill for a fix. He can help solve your programming problems.

Merging Subroutines

Dear Bill:

I've been computing for only about seven months, and this month I finally upgraded to a disk system. I've written several programs that use the same subroutine. Up until now when I wanted to start a new program, I deleted all the lines from the previous program except those of the subroutine I want to re-use. What do I do, short of re-entering those lines, if I've already started a program and decide I'd like my old subroutine added? Any help you can offer will be greatly appreciated.

Todd Barkley
Orange, CT

That particular question was one I asked a few years ago myself. I've since gotten some extended use out of the procedure I'm about to explain. It's called `MERGE`, and it is really quite handy.

There are only a few things you have to remember when using the `MERGE` command. First, the program or portion of a program you'd like to add to the main program must first be saved in ASCII format. To do this, simply isolate your routine, deleting all line numbers you won't be using. What's left we'll call `SUBX` (SUBroutine X). We'll call the main program `MAIN`; it will be numbered starting with Line 10 and continuing through Line 300.

Personally, I like to renumber my subroutines before I save and merge them, but you don't have to. However, just humor me for now and do it this way. Later on, when you become familiar with the procedure, you can take all sorts of liberties.

All right, so now you have `SUBX` and nothing else in memory. Type `RENUM 1000,10,10` and press ENTER. To see the results, type `LIST`. You'll notice that `SUBX` now starts at Line 1000 and continues listing in increments of 10. You can renumber starting with any number you like, as long as it's higher than the last line number of the program to which you want to merge it — at least for this example. Now that you have your renumbered `SUBX` in memory, save it in ASCII by typing `SAVE "SUBX",A` and pressing ENTER. Now if you type `DIR` and press ENTER, you'll see that your subroutine is saved on disk. Make sure that this ASCII-saved subroutine and the main program are both on the same disk.

Bill Bernico, RAINBOW's newest columnist, is the author of more than 300 Color Computer programs. He founded Bill Bernico Software in 1987 and enjoys writing and recording his own music.

Once both of these files are on the disk, type `LOAD"MAIN"` and press ENTER. At this point `MAIN` is now in memory and `SUBX` is only on the disk. Once you've loaded `MAIN`, type `MERGE "SUBX"` and press ENTER once again. You'll hear the disk drive churning. When it stops and the OK prompt appears, your two files will be merged into one. To make sure, type `LIST`, press ENTER and you'll see the program scroll by. You can halt the scrolling any time by pressing SHIFT and @ simultaneously.

You'll notice, as `MAIN` scrolls by, that when it gets to Line 300, the next line is 1000. This is where `SUBX` picks up. Now you're free to continue adding more lines to the main program between lines 300 and 1000. When you need to access your subroutine, add a line that says `GOSUB 1000`.

Now the two merged files are in memory, but you'll have to re-save them to disk again. Call the product of the merger `MERGPROG`, for example, type `SAVE"MERGPROG"` and press ENTER. That's about all there is to it. It'll save you a lot of extra typing and time.

DATA Dilemma

Dear Bill:

How does one understand and write `DATA` *statements as part of a BASIC, pseudo machine language, program? I can understand the basic concept of a line like*

```
READ A:FOR I=&Hxxxx to &Hxxxx
:POKE I,A:NEXT I
```

but from there on, my comprehension fails me. What are the numbers in the `DATA` *statements? What do they stand for, and most of all, how do we (the programmers) know where to get them and how to put them in the proper order?*

I would really appreciate being enlightened because some programs are written entirely in `DATA` *statements. Thanks for your help.*

Bernice Shoobs
Clifton, NJ

It's funny that you'd ask me this question, Bernice. I wondered about it myself for a long time and finally asked someone more familiar with the procedure than myself about it.

I learned that the program is first written in assembly language using an editor/assembler. When the process is complete, you have a *binary* file. Since, on a scale of one to 100, my knowledge of ML programming is about .00001, I can't help you with the procedure of assembling the code.

However, from what I understand, once you have that binary file, you can convert it to BASIC by using a short program that changes the binary code to `DATA` statements. Kevin Davidson's utility, *MacData*, [RAINBOW, "The Demystification of ML On Disk," December '83, Page 181] would accomplish this task. I've tried the program and have converted several binary files to BASIC programs. These programs go a little slowly, but they work fine.

From Text to Graphics

Dear Bill:

I'd like to convert some of my favorite BASIC text programs to the graphics screen. Without doing a lot of guessing, is there a way to figure out where to draw so that the text will appear in about the same position on the graphics

Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

◆ **The Answer**, a program that allows you to communicate with your "inner self" via subliminal messages. For the CoCo 3. *Alpha-Biotechnologies, Inc., P.O. Box 2203, Richmond, IN 47375, (317) 962-6644; $29.95.*

◆ **Armchair Admiral**, a Battleship-type game for up to eight players that places you at the helm of four ships — a sloop, caravel, brigantine and galleon. "Your orders are to stay afloat while trying to sink your enemy, who is in command of identical ships." For the CoCo 3. *Eversoft, P.O. Box 3354, Arlington, WA 98223, (206) 653-5263; $14.95 plus $2 S/H.*

◆ **Bash!**, a one- or two-player machine language arcade game, similar to *Breakout*, that has players ping-ponging and blasting away "bricks" (the scenario involves construction). There are 20 screens of debris that must be cleared away. If you catch the special falling bricks, you will be rewarded with points. For the CoCo 3 and disk drive. Program written by SRB Software but available exclusively through Game Point Software. *Game Point Software, P.O. Box 6907, Burbank, CA 91510, (818) 566-3571; $24.95 plus $3 S/H introductory offer, regularly $29.95 plus $3 S/H (demo disk, $4.95).*

Deluxe Icon Editor, an AIF icon editor running under OS-9 Level II in the *Multi-Vue* environment on 512K CoCo 3s. Documentation is included on the disk. A mouse and a high resolution interface are recommended, but not required. Requires 512K CoCo 3, OS-9 Level II and *Multi-Vue. Puritas Springs Software, Ameritrust Building, 17140 Lorain Ave., Cleveland, OH 44111, (216) 251-8085; $10.95.*

Horse Sense, a horse race handicapping program that breaks the race down into three sections — call, second call and wire. The speed of the horse is computed in feet/second for each of these sections. For the CoCo 1, 2 and 3. *Western Hills Software, 6133 Glenway Ave., Cincinnati, OH 45211, (513) 662-3233; $24.95.*

The KJV on Disk: Mark, the Bible's book of Mark on disk in ASCII files for importation into a CoCo 1, 2 or 3 word processor. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; $3.*

◆ **MacPlay**, a program that allows you to play Macintosh digitized sound files, which can be downloaded from CompuServe or Delphi. For the CoCo 3. *CoCoTech, Inc., 208 Cathy Ann Drive, Reading, PA 19606, (215) 779-7768; $19.95.*

◆ **Mine Rescue**, an action ML game for one or two players. Your mission is to rescue trapped miners whose air is rapidly running out. You can pick up extra points on the way by gathering gold and gems while avoiding falling icicles and the banshee. Carrying tanks of fresh air, you will climb rocks and ladders and leap pitfalls. The game was written by SRB Software but is available solely through Game Point. Requires CoCo 3, disk drive, joystick and color/RGB monitor. *Game Point Software, P.O. Box 6907, Burbank, CA 91510, (818) 566-3571; $24.95 plus $3 S/H introductory offer, regularly $29.95 plus $3 S/H (demo disk, $4.95).*

R.S.B., an adaptation of Disk Extended Color BASIC for OS-9 Level II. The command syntax is identical, and BASIC programs may be run in several windows simultaneously. Commands are accepted in both upper- and lowercase, and all I/O uses OS-9 system calls. For the CoCo 3 and OS-9 Level II; compatible with *Multi-Vue. Burke & Burke, P.O. Box 1283, Palatine, IL 60078, (312) 397-2898; $39.95.*

Scenery Disk #7, a scenery disk for *Flight Simulator II* that covers the eastern seaboard from Washington D.C. down to Miami. It includes the major airports, radio-nav. aids, cities, highways, rivers and lakes. A map is provided. For the CoCo 3, requires *Flight Simulator II. subLOGIC Corporation, Champaign, IL; available through subLOGIC's order line: (800) 637-4983; $24.95.*

◆ **Security Projects for the TRS-80 Color Computer**, a book of hardware projects including a "vacation light," a temperature alarm, a sound-activated alarm and an intrusion alarm. *Brown's Enterprises, 119 Skyline Drive, RH, Granbury, TX 76048, (817) 573-0037; $7.50.*

Tax Estimator, a tax program, placed in the public domain, that helps users estimate their federal income tax liability in preparation of forms 1040, 2106 and 2441. It may be obtained for a $5 shipping and handling fee. For the CoCo 1, 2 and 3. *Try-O-Byte, 1008 Alton Circle, Florence, SC 29501, (803) 662-9500; $5.*

TypeMate, a menu-driven typing tutor that draws the CoCo keyboard onscreen; whenever a key is pressed, the screen's keyboard echoes it. The program instructs beginners in correct finger placement, charts a course of study, and provides typing exercises and the capability for users to create their own lessons. Requires a CoCo 1 with 32K, a CoCo 2 with 64K or a CoCo 3. Supports cassette recorders and a printer. *Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX: Available in Radio Shack stores nationwide.*

◆ **Warp Fighter 3-D**, a one-player, joystick-controlled 3-D space fighter Simulation in which you must shoot down the Akaira enemy from 25 sectors of space. To move quickly from one sector to another, your ship is equipped with the Federation's new warp drive. 3-D glasses are supplied (for $2.95). For the CoCo 3 and disk drive. Program written by SRB but available exclusively through Game Point Software. *Game Point Software, P.O. Box 6907, Burbank, CA 91510, (818) 566-3571; $24.95 plus $3 S/H introductory offer, regularly $29.95 plus $3 S/H (demo disk—without 3-D glasses—$4.95).*

Western European Tour Scenery Disk, a scenery disk for *Flight Simulator II* that covers southern West Germany, northern France and southern United Kingdom. It includes the major airports, cities, highways, rivers and lakes, and includes a map. For the CoCo 3 and *Flight Simulator II. subLOGIC Corporation, Champaign, IL; available through subLOGIC's order line: (800) 637-4983; $24.95.*

ZoomDump, an update to the `PMODE 3` or `4` graphics screen dump for the DMP-105 and DMP-106. New features include horizontal paper positioning and the ability to print any rectangular section of the screen, along with upright or sideways images. For the CoCo 1, 2 and 3. *Codis Enterprises, 2301-C Central Drive, Suite 684, Bedford, TX 76021, (817) 283-8571; $14.*

◆ **First product received from this company**

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Lauren Willoughby

have edited at least one module. When you create a bootable disk for the first time using `OS9Gen` or `Config`, you are combining a number of modules into a program called `OS9Boot`. While `Config` is perfectly capable of creating `OS9Boot`, it is time-consuming at best.

EZGen comes into play when you want to alter, add to or delete from an existing program that consists of a set of modules. Using only the programs available with OS-9, these tasks are quite tedious. For example, when I bring my system to school with me I use a single drive instead of the two drives I use at home. I have been putting off deleting the `d1` device descriptor module in the `OS9Boot` program for my school disk because it would take too long to generate a new `OS9Boot` using `Config`.

As a working test of *EZGen*, I removed `d1` from `OS9Boot` in about 10 minutes, which included reading the manual. Patching the existing device descriptor for a 12-millisecond step rate was also a quick and painless job. Finally, I added the two RAM disk modules to `OS9Boot`. All of this was done with *EZGen* alone.

EZGen has several other capabilities that some people may find handy. It allows you to rename a module, patch a module using either Burke & Burke's Patch format or the Disk BASIC binary format, save a module to disk, extend a module and add a module header.

The last two abilities are quite interesting and powerful for the hard-core types like me who like to do things in unusual ways. For example, using a file transfer program I can move a machine language program from the Disk BASIC environment into OS-9. Then, using *EZGen*, I can add a module header so that the program can be loaded by OS-9. Once it's loaded, I can use one of the powerful OS-9 disassemblers on the program. Being able to extend a module easily can allow you to add a small subroutine to an existing module without having to disassemble the whole thing first. I did that once and it was very tricky. With *EZGen* it could be a snap.

There are a few things I wish *EZGen* could do, or at least could do better. First is an ability to locate modules and data blocks within programs. You must know the names of the modules you'll be working on in order to tell *EZGen* which module name to find. This problem isn't insurmountable; you can get module names with `Ident` before you start (or by forking a shell from within *EZGen*), but it would be easier if there were some way to call a list of module names from within *EZGen*.

Another wish is related to a problem I had with user mistakes. Any user mistake causes *EZGen* to quit and return to OS-9 unless the command is preceded by a hyphen. I have a nasty habit of pressing ENTER a couple of times when I'm working in this type of program just to be sure it's awake and operating. Every time I do this, *EZGen* quits and I have to start it again. This isn't a flaw or a bug, just a way of doing things that takes time to get used to.

Another problem I had was with disk space. Because *EZGen* has to create at least one copy of the module you are editing, you need sufficient disk space to use it. I suggest that any program with *EZGen*'s power should be used on a backup. And because of the disk space problem, I recommend placing the backup on a nearly empty disk — especially if the module you are working on is large.

I also have some problems with the manual. The style is that of standard UNIX "man" entries. This is OK for experienced users who know exactly what they want to do, but it can be intimidating to new or occasional users who aren't familiar with the terse style. The manual could also use more examples and a better explanation of what *EZGen* can be used for. With some experimentation, most OS-9 programmers who have a use for *EZGen* will be able to figure it out, so I guess the manual isn't a big handicap. I just think that it could be expanded some.

Included with *EZGen* are two other programs that work as a team or individually for very specific tasks. *TagTrack* corrupts the OS-9 file system in a controlled way that lets you determine which files reside at least in part on a particular track. Using *TagTrack* you can locate, edit or delete the OS-9 kernel, or you can find the files that need to be deleted to clear a particular track for some reason (creating a disk readable by OS-9 as well as Disk BASIC, for example).

Zap can undo the corruption caused by *TagTrack*. It does this by releasing the directory entry and file descriptor sector for a file without releasing the sectors in use. It can be used to make a sector or group of sectors unusable by OS-9. These things can be done using a patch program or disk editor, but they are very tedious that way. Burke & Burke has given us a way to perform several difficult tasks quickly and easily.

If you've ever done any of the jobs that *EZGen* can do, you already know how much you need this package. If you don't see a reason why anyone would want to do what I described, then maybe you should wait until you need it. Just remember to get *EZGen* before you start — it'll save you an awful lot of work.

(Burke & Burke, P.O. Box 1283, Palatine, IL 60078, 312-397-2898; $19.95 plus $1.50 S/H)

— Donald McGarry

Corrections

"Received and Certified" (October 1988, Page 130): The *Hard Bodies* program was incorrectly listed as the first review product from Baron Products for review in THE RAINBOW. An earlier Baron Products program, *Track Events*, was reviewed in the February 1986 issue (Page 200).

"Quick Fixes" (October 1988, Page 58): An IC pin is incorrectly labelled in the schematic shown in Figure 2 (Page 62) of the article. On the right-hand side of the figure, the designation IC4 Pin 3 should be changed to IC4 Pin 5.

For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type DATA at the CoCo SIG> prompt and INFO at the TOPIC> prompt.

Your OS-9 programs can then be called up with a single keystroke. It can also change the data and execution directories of any OS-9 operating system.

With my 512K CoCo 3, I was capable of building the required "menu options" file quickly and easily. Building the required batch files that are to be executed in accordance with my selection was a piece of cake. Now the menus presented reflect the types of OS-9 files my hard drive contains. I press one key from the menu calling up BASIC09, and within seconds it pops up on my 80-column screen. Impressive.

I wondered how fast it would be to get a file buried within my hard drive. So I exited BASIC09, and *Hard Disk Organizer* automatically returned to my screen. It sorted through a huge pathlist that I normally type in by hand, and all I did was press one key. It operated quickly and flawlessly.

The program is compiled in C language for speed and portability. It fully supports OS-9 windows and remote terminal users. Many different terminal configurations are supported, including ANSI, ATS and Z19.

The disk is not copy-protected, so you are capable of making a backup copy for safekeeping. The documentation is well-written and takes you step-by-step through a lot of examples, so you can get your system up quickly and to your liking.

The documentation states that the software can be used successfully on a CoCo 2 in addition to a CoCo 3, with Level I and II OS-9 systems. No memory requirements are mentioned in the documentation. I found that the software operated flawlessly on my 512K CoCo 3 but would not operate on a 128K CoCo 3 because of insufficient memory.

I ran into the same memory problem when trying the CoCo 2 version on my 64K CoCo 2. It would not operate completely due to the procedure of "forking." (To fork a process means to create a process as a branch of another process — a subroutine.) It could not fork large application programs on the lower-memory machines, due to the available free memory. But, to be fair, the author does mention that he is developing a procedure to "chain" to the application program instead of fork.

Considering all that this software does, I feel it is reasonably priced and well worth the money for 512K users. You do not need to be an OS-9 expert, and in fact I feel this software will benefit those who are beginners, especially because new OS-9 users often have a hard time getting used to typing long pathlists.

(Robert A. Hengstebeck, 408 Grandview Ave., Feasterville, PA 19047, 215-322-5455; $24.95)

— Brian R. Smith

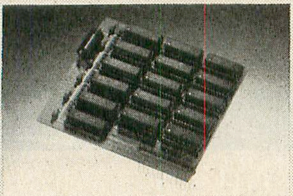
Software CoCo 1, 2 & 3

EZGen — OS-9 Module Editor

EZGen from Burke & Burke is the kind of product that most OS-9 users will probably not need to use often — but when you need it, you really need it. As its name implies, *EZGen* is a module editor for the OS-9 Level I or II operating environments.

My initial reaction to the product was one of minor confusion. After all, why would anyone want to edit a module? It turns out that almost all OS-9 users

TURBO RAM BOARD



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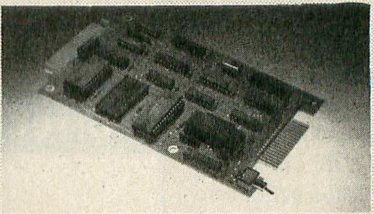

$99.95*

*ROM not included (RS DOS 1.1 ROM—$19.95). 32K SRAM—$16.95.

- 100% Compatible with existing H/W & S/W
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will destroy you and your ship. You get three misses before the game is over.

Frequently you will see the message "Press the Space Bar" displayed in the window. This is a warning that an alien vessel is about to materialize in front of your ship, and you must deploy your defense shields for protection. This is where I had trouble with the program.

As your ability to destroy the attacking meteors improves, you will move to the next level of difficulty. One such level concentrates on the "second" row of keyboard keys, or the one just above the home row. The different levels are intended to drill the user by requiring all of the keyboard keys to be depressed in various random character sequences. As levels are increased and progress is made, the user becomes a keyboard commander and earns a certificate available from the author.

Like most skills, typing requires a lot of practice. *Keyboard Commander* can provide some of the necessary practice in a manner that children will enjoy. The program provides the beginning typist with a clever, challenging way to learn the location of the various keys on the CoCo keyboard. Programs that use a "game" approach have proven to be effective learning tools. *Keyboard Commander* is such a program.

Keyboard Commander is supplied on a non-protected disk. The program utilizes artifact `PMODE4` colors, and it looks best on a color composite monitor or a TV set. (If you use an RGB monitor with your CoCo 3, you will not be able to see the beautiful colors this program has to offer.)

(E.Z. Friendly Software, 118 Corlies Ave., Poughkeepsie, NY 12601, 914-485-8150; $24.95 plus $1.50 S/H)

— Jerry Semones

Software CoCo 1, 2 & 3

Spellbound — Wizards, Warriors and Dungeons

Down in the lowest dungeon waits the Archwizard! Can your hardy band of Adventurers overcome monsters, avoid hazards and gain enough strength to defeat him? Can you guess his name and banish him forever? It will take many hours to find out in this Dungeons & Dragons-type text Adventure.

Visit the Adventurer's Guild to create your team, collect them at the Unicorn Tavern, then go on over to Elmo's Trading Post for equipment. Choose well, for in the vast dungeons below there are many monsters intent on destroying your team. Your characters may be human, dwarf, gnome or elf and function as paladin, fighter, thief, priest or wizard. CoCoists with a printer will be able to make a hard copy of both the roster and individual inventories. The latter come in very handy as the game progresses. I made an accordion-fold booklet that I consulted at every encounter and updated while in "camp."

> ***"The dungeons abound with secret passages, treasures, tricks, hazards and monsters. The deeper you go, the greater the hazards and the better the rewards."***

The game is easy to play — just press a key. In the dungeons, the screen is divided into two parts. To the right is a list of the characters and a move menu. To the left is a view of the dungeon, in perspective, as you see it looking forward two squares. Mapping is a bit tricky at first. Careful study will soon make it clear. If you really get lost, you can have your wizard use the "map" spell. You won't see a diagram, just coordinates of your location relative to the Bronze Door (entrance). I found this was adequate.

Camp is available any time there is no attack in progress. It is a place to view inventory, make changes, use spells (heal) or sleep (save). Each level of advancement adds a new spell; some protect or heal the Adventurers and others aid in defeating monsters. For proper updating of the disk, the Adventurers should retire to the Green Dragon Inn; however, camp may be more convenient at times.

The dungeons abound with secret passages, treasures, tricks, hazards and monsters. The deeper you go, the greater the hazards and the better the rewards. (Dungeon 6 is a zinger! Teleporting from Dungeon 5 to 7 would have real appeal.)

There are other places aboveground that are of interest: The Temple of Ymiro offers healing and advancement, and the library may hold some clues.

The documentation is very good. The author offers full technical support (but no clues!). Send a stamped, self-addressed envelope *(SASE)* for a reply to your questions. I used both CoCo 1 and CoCo 2 with no problems. The manual is very useful. The choices and spells are fully explained, so a novice can play the game as well as the more advanced.

This is a game more for Dungeons & Dragons fans than Adventure addicts. The action and the objects are average, but the dungeons (mazes) are excellent. *Spellbound* is written in BASIC, which makes for a brief delay when leaving camp. There is nothing wrong; in a short time, the screen clears and the game continues.

The biggest drawback is the lack of sound — no beeps to warn of attack or danger. The author is planning to remedy this. Some messages disappear too fast; however, the important ones wait for a key press.

There is enough room on the disk for 12 characters, which can be used six at a time. The extra characters should be developed for future use. Several backups are recommended for emergencies. It will take many hours, maybe months, to be ready for a confrontation with the Archwizard. I am neither a novice nor an expert (though I am good at mapping), and I enjoyed playing the game. *Spellbound* requires 32K, one disk drive and a CoCo 1, 2 or 3.

(Thor Software, Suite 162, 9431 Westport Road, Louisville, KY 40241, 502-588-5969; $16.95: First product review for this company appearing in THE RAINBOW.)

— Audrey De Lisle

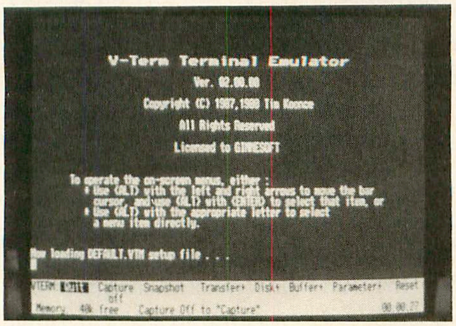
Software CoCo 3, OS-9

Hard Disk Organizer — Type Around Long Pathlists

Don't let its name fool you — the *Hard Disk Organizer* will organize your OS-9 floppies, too.

In a hard drive system, the `CMDS` directory will invariably become unmanageable due to the number of executable programs found there. *Hard Disk Organizer* allows a user to develop menu-driven pathlists so that any application program can easily be accessed.

Vidtex emulation not only supports wide character display, but also medium and high resolution RLE graphics.



```
V-Term Terminal Emulator
Ver. 02.00.00
Copyright (C) 1987,1988 Tim Koonce
All Rights Reserved
Licensed to GIMMESOFT

To operate the on-screen menus, either :
  • Use <ALT> with the left and right arrows to move the bar
    cursor, and use <ALT> with <ENTER> to select that item, or
  • Use <ALT> with the appropriate letter to select
    a menu item directly.

Now loading DEFAULT.VTM setup file . . .

VTERM        Capture  Snapshot  Transfer+  Disk+  Buffer+  Parameter+  Reset
             off
Memory  48k free   Capture Off to "Capture"                          00.00.27
```

I was able to decide exactly how I wanted my screen to appear, including border color, background and foreground color of both the main screen and the menu display by cycling through the 64 possible colors available for each. If you spend a lot of time in front of your monitor as I do, I think you will find this very useful in finding a combination that is easy on the eyes.

Going from one BBS to another and searching for some of the excellent public domain programs that are out there is one of my favorite pastimes. If you've ever downloaded a file from a BBS I'm sure you know how annoying it can be having to stop, save the file to disk and then clear the buffer before you can either download or upload another file. *V-Term* can save you some time. *V-Term* uses a RAM disk type buffer that allows you to have several different files in the buffer at the same time.

You are limited only by the amount of buffer memory available, which in a 512K CoCo leaves about 456K available for buffer storage. A 128K CoCo would have a 72K buffer. This buffer could save you a lot of time and money if you do much in the way of long-distance file transfers. *V-Term* also gives you the option of saving your files to disk instead of memory. While I am on the subject of file transfers, I think I should point out that *V-Term* gives you the options of using either line-oriented ASCII, Xmodem, Xmodem CRC or Ymodem transfer protocols.

V-Term will work with just about any hardware configuration. This includes the back-panel serial port (up to 2400 baud), the DCModem pack, and even deluxe RS-232 packs that have been altered to be addressed at $FF6C to $FF6F. Not to mention 35-, 40- or even 80-track drives (providing the DOS you are using supports 40 or 80 tracks — but not *JDOS*). This should be a welcome feature to those of you using the popular *ADOS-3*.

I must admit the program lacks one feature — the ability to write to the buffer. I did not consider this to be a major problem, though, because it is possible to write to the buffer using the VT-100 mode and *V-Term*'s "snapshot" feature, which copies the current screen to the buffer. The author told me that he plans to include this option in future versions of *V-Term*. I was also told that anyone currently using Version 1.0 can upgrade to Version 2.0 for just $7 plus $3 postage and handling.

Overall, I found this program to be everything I could hope for in a terminal program and well worth the price. I would also like to add that the distributor was extremely courteous and helpful with the few questions I had and even went out of the way in helping me get in touch with the author, who was on vacation at the time. In my opinion, this kind of service is priceless.

(Gimmesoft, P.O. Box 421, Perry Hall, MD 21128, 301-256-7558; $39.95 plus $3 S/H)

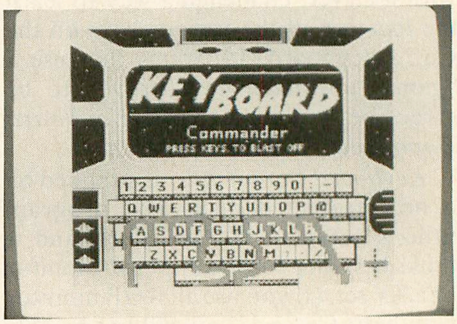
— Bryan Gridley

Software CoCo 1, 2 & 3

Keyboard Commander — Learn To Type While Saving the Galaxy

Keyboard Commander is a typing tutor written for the 64K CoCo 1 or 2 (and CoCo 3) that teaches typing basics in a most unusual way: The student becomes a commander of a spaceship, and the keyboard keys are the controls. Interesting sound effects give the program an arcade flavor.

After the program loads and executes, you will see the inside of your spacecraft, the window and the controls (which just happen to be in the form of the CoCo keyboard). Transparent hands are shown in the "home position" and can be seen moving about the keyboard during flight.



The object of *Keyboard Commander* is to shoot down the "letter meteors" that randomly rush toward your ship. You destroy these meteors by pressing the letter on your keyboard control that represents the letter attacking your ship. If you fail to press the correct key, or if you take too long, the letter meteor

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"Start OS-9" ($32.99 + s/h) is a product of Kenneth Leigh Enterprises. To reserve your copy of the book with accompanying software disk, write SMS-KLE, 2540 Potomac Hunt Lane, Suite 2A, Richmond, VA 23233 OS-9 is a trademark of Motorola and Microware Systems Corporation.

screen as it did on the text screen? That is, if the original program had PRINT@ 294, "TEST", *how would I know where to position the* DRAW *equivalent?*

Allen Owens
Monticello, SC

Good question, Allen. I've done a lot of what you are proposing, so I think I can help clarify it for you. At first, I did a lot of guessing. Then I stopped to think about it. To illustrate what I learned, let's use a PMODE 4 screen.

Keep in mind that on the PMODE 4 screen, you have 256 pixels across by 192 pixels down on which to position text. If you divide the 256 pixels by 32 (the number of characters across on the text screen), you get eight. This is the width of each character. Now divide 192 pixels by 16 (the number of characters down on the text screen). The characters are 12 pixels high.

There are three steps in placing text on the graphics screen. First, you must define each character and put it into A$(32) to A$(90). This will give you most characters, excluding lowercase. Second, you must define the DRAW area, and finally, you must GOSUB to the DRAW subroutine.

Suppose you want to put the message "Basically Speaking" on the text screen. Simply type the following:

```
PRINT @ 294, "BASICALLY SPEAKING"
```

You now have the message displayed on the standard 32-column screen.

On the Hi-Res graphics screen, you would type the following:

```
A$="BASICALLY SPEAKING:"DRAW
"BM48,108":GOSUBxxxx
```

(where *xxxx* is the line number at which your DRAW subroutine is located).

Why coordinates 48,108, you ask? Simple. PRINT @ Location Number 294 on the text screen is six spaces over and nine spaces down. Multiply 6 by 8 (the width of your graphics character) and you get 48. Multiply 9 by 12 (the height of each character) and you get 108.

If your message doesn't look centered, edit the message line to read PRINT @ 295 instead of 294, and the message will be centered. On the graphics screen, however, you change the first DRAW coordinate from 48 to 56, since you have to move eight more pixels to the right to equal one space on the text screen. Now your DRAW coordinates are 56,108.

The message is now centered *across*. To move closer to the center *up and down*, type PRINT @ 231 instead of 295. On the graphics screen, you will need to move up two spaces (24 pixels). To match the position on the text screen, your new DRAW coordinates should be 56,84.

Thinking logically is as essential as knowing how to program the computer. Everything the computer does relates to numbers in one way or another. I found out some of what I know purely by accident. The rest fell into place as I made changes and discovered that most of the changes in coordinates were divisible by 8. (Hmmmmm.)

Questions about specific BASIC programming problems can be addressed to BASICally Speaking, THE RAINBOW, P.O. Box 385, Prospect KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. We are unable to answer letters individually.

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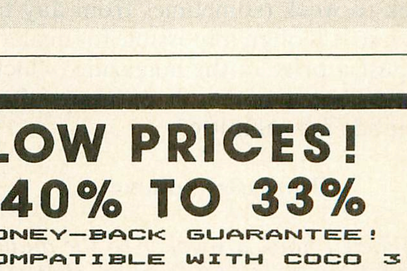

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Speaking of DRAM Prices . . .

In this time of high DRAM prices (which has forced most RAINBOW advertisers to either charge up to $200 for an upgrade or supply no chips with 512K boards), I am pleased to report that I recently bought Tandy's 512K CoCo 3 upgrade for under $140.

Marlin Lee Simmons
(LINLEE)
Bridgewater, VA

The DRAM-chip price situation is unfortunate. Dealers and end users alike have been hurt by the part's price increase. I believe Tandy was able to order a large quantity of these chips at a "locked-in" price. However, soon (perhaps before readers see this printed) Tandy will be forced to raise its prices, too. The increases in the prices charged by RAINBOW advertisers for 512K CoCo 3 memory upgrades reflects the extreme increase in cost for the chips. Note, too, that the price of these chips varies from week to week (sometimes from day to day), so it is often impossible for dealers to post a price in the magazine, which is distributed a month or more after their ads are submitted.

Increased Volume

When I hook a speaker to the audio output on my CoCo 3, the volume is very low. How can I use an amplifier with it?

Matt Hazard
Columbia Station, OH

Feed the signal coming out of the audio output jack on the CoCo 3 into the auxiliary input on any high fidelity amplifier. Use that to drive a speaker. You could also hook the audio output of the CoCo 3 to the audio input of a Radio Shack speaker-amplifier (Cat. No. 277-1008) using Radio Shack cable 42-2444.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

COCO Q&A CONSULTATIONS

By Marty Goodman
Rainbow Contributing Editor

Memory Upgrades and a 3½-inch Drive 1

I'm considering increasing my CoCo 3's memory to 512K and getting one of the new word processors specifically designed for the CoCo 3. However, the buffer of some of those programs exceeds the storage capacity of my 5½-inch drives. Will a 3½-inch drive work as Drive 1? How would I hook one up? I have a standard Radio Shack controller and a FD 502 as Drive 0.

Paul R. Broshear
(GROUCHY)
Saddle Ridge Trail, TX

Your major concern is how to best use one of the current generation CoCo 3 word processors, and 512K is not needed for such CoCo 3 word processors as *Telewriter 80*, *Word Power 3.1*, *Telewriter 128*, or *VIP Writer III*. The jump from 128K to 512K really does not add much in terms of actual function. At the current DRAM prices of $12 a chip, the 512K upgrade is hideously expensive.

512K *is* essential if you want to run programs under OS-9 Level II. But for most Disk BASIC word processor programs, 128K should be all you ever really need. As you noted, Disk BASIC is not set up to save files bigger than 153K of data (the capacity of a single-sided disk) even with double-sided drives. You can go to 3½-inch drives. They are electrically identical to 5¼-inch drives, and using ADOS (from Spectrosystems), you can store up to a 350K file on each side of the disk. Some of the hard drive systems for the CoCo (like Burke & Burke's or RGB System's) can also handle large files under Disk BASIC. (Of course, they cost a few hundred dollars.) I do recommend that you get ADOS, if only to access your FD 502 on both sides (as if it were two drives). This will not increase the size of the biggest file you can store, but it will allow you to store twice as much on a disk.

Artifact Colors on the CM-8

Is it possible to build a TV tuner that hooks up to the CM-8 monitor or to add a composite video input to the CM-8 monitor with some adapter or hardware project? I bought a CM-8 and am unable to see the red and blue artifact colors in the many games that use the `PMODE 4` *screen.*

Perry M. Dueck
Rosenort, Manitoba

You *cannot* modify the CM-8 for RF or composite video input. While it is technically possible to do what you ask, there are no commercial devices on the market to do that and cost less than a brand new Magnavox monitor. Making such a device from scratch would involve considerable design effort, and no one who could make such a device would bother to make one for the CM-8. Those who have not yet bought an RGB monitor should note that the CM-8's lack of composite video input makes it *incapable* of displaying proper `PMODE 4` artifact colors. The Magnavox monitor (sold by many `RAINBOW` advertisers) has composite video inputs (as well as other inputs) and has a sharper, higher resolution screen than the CM-8.

I suggest that those who have a CM-8 buy *RGB Patch* from Microcom. This program will allow the CoCo 3 to display some degree of "artifact color" on a CM-8 when used with most Disk BASIC games and other graphics programs. Sadly, *RGB Patch* will not help with programs running under OS-9 (including the newer Tandy OS-9 games like *Rocky's Boots* and *Robot Odyssey*).

Also, see Steven Ostrom's "Artifact

Colors on CoCo 3's RGB,"(February '88, Page 114).

Specifying CoCos

I have a CoCo 2 (Model 26-3127B). What sort of a CoCo is that? Also, where can I get the 256K/512K Super RAM cartridge?

Michael D.
Zanesville, OH

The Model 26-3127B is the last 64K Extended BASIC Color Computer 2 that Tandy made before discontinuing production of the CoCo 2. Its circuit board was set up so that it could accept 64K of memory in any of three different ways: eight 64K-by-1-byte chips on the main board, eight 64K-by-1-byte chips on a plug-in satellite board, or two 64K-by-4-byte chips in two 20-pin sockets on the main board. This model also featured the TI VDG chip that, with special software, supported lower-case characters in the 32-column video mode.

The 256K/512K Super RAM is sold by CRC in Canada. It is a RAM-disk card that plugs into the Multi-Pak Interface. It works quite well under OS-9 but has limited compatibility with Disk BASIC programs.

Monitoring Questions
Super VHS, 80-Columns and 3½-Inch 80-Track Drives

I have three questions. First, will the Magnavox 8CM515 monitor support the new super VHS video format? Second, my television cuts off the last two or three characters on the left-hand side of the screen when I put my CoCo 3 in 80-column mode. What can I do about this? Finally, how can I use 3½-inch 80-track drives under Disk BASIC?

Bill Sanders
Chula Vista, CA

First, the Magnavox 8CM515 does not offer the sort of chromanance/luminance video input used with the super VHS format video signals. However, if that format catches on, adapters that will convert a chromanance/luminance signal to a RGB signal should become available commercially. Such adapters, if and when they are available, will allow any RGB analog-capable monitor to be used with the super VHS format.

Second, your problem with missing characters is caused by the *overscan* setting for the horizontal-width control. This is common to most broadcast TV sets. The CoCo 3's 40- or 80-column mode was not really designed for use with broadcast televisions. In fact, programmers who write 40-column based software for CoCo 3s with television monitors know about this problem and don't use the extreme left columns. In theory you could open up your TV and adjust the horizontal width internally (usually there is a ferrite slug in a coil somewhere that controls this), but when watching TV shows you'd probably see a black border at the left.

Finally, Disk BASIC is poorly suited to use with 80-track drives, and I recommend that you do not try it. If you insist on trying, check with Burke & Burke about its *Hyper I/O*, or with Spectrosystems about ADOS. Those companies make patches that (to a certain extent) will allow you to use 80-track drives with Disk BASIC.

Upgrading the Modemphone

Is there any way to upgrade a Tandy Modemphone to run at 1200 or 2400 baud?

Keith H. March
(KEITHMARCH)
Continental, OH

I'm afraid that 1200- and 2400-baud modems are different both from each other and from 300-baud modems (more expensive to make, too). There is no reasonable way to convert one to another. You *must* buy a new modem if you want higher baud-rate capability than your current modem supports.

Major Circuitry Differences

A circuit for the CoCo 1's color monitor driver appeared in Hot CoCo, *August '83. I was unable to get this circuit to work on a CoCo 2. Can you help me?*

Fulton Smith, Jr.
Southfield, MI

Even though the circuits may appear similar at first glance, the color video circuitry of the CoCo 2 is quite different from that of the CoCo 1. Unlike the CoCo 1, the CoCo 2 uses the RF modulator portion of the 1372 chip. Therefore, there is virtually no color video signal available where there is on the CoCo 1 circuits. Color monitor driver circuits for the CoCo 2 are considerably more complicated than those for the CoCo 1, and because there were several available commercially when the CoCo 2 was in production, I never bothered to develop one myself. Now that the CoCo 2 is no longer in production, many of those monitor drivers may not be available. Try Computerware, and check the ads in RAINBOW for other possible sources.

ADOS to the Rescue (Again)

How can I permanently program F1 and F2 to complete various functions or commands? How can I do the same with other keys?

Claud Gervais
Herouxville, Quebec

Although frequent readers of this column may be tired of seeing me plug the system, ADOS (sold by Spectrosystems) is the answer to your question. Once configured and burned into the EPROM that will replace your Disk BASIC ROM, ADOS allows you to have single key strokes produce customized results *permanently*, (i.e., creating various BASIC programming word or multiple-word commands).

Asking the Impossible

Can I use a CoCo 3 and a DCM 6 modem to send Spectaculator *worksheets from Ymodem to my company's FAX machines?*

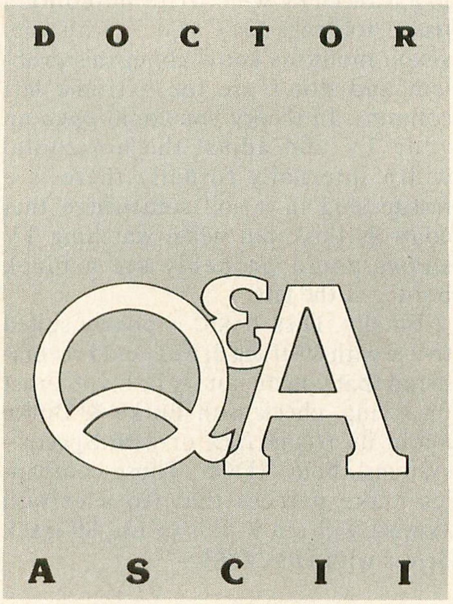
Augusto Vajsest
Lima, Peru

I'm afraid that is not possible for two reasons. First, spreadsheets consist of character, or ASCII, data. FAX data consists of graphic, or photographic, data. Second, the way in which 300-baud computer modems encode data differs completely from the way in which the modems in FAX machines encode their data.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.



By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

T/S Spell and *TW-64* Compatibility

I recently purchased Tandy's OS-9 based spelling checker, T/S Spell. *Files saved to disk under my favorite word processor,* TW-64, *will not read into* T/S Spell. *I assume that the difference in directory locations between Disk* BASIC *and OS-9 is at least part of the problem. Both are super programs. Is there a way to make them compatible? I have a CoCo 3 with 128K, two Radio Shack disk drives, a CM-8, a DMP-200 printer, and a CCR-81 recorder.*

Edward Scott
Canaan, CT

℞ The directory structures for OS-9 and Disk BASIC differ completely. To check the spelling of a *TW-64* document with *T/S Spell*, save the document in ASCII format and then use a file transfer program (like *TRSCopy*) to move it over to an OS-9 diskette.

ROM Pack Problems

I have just received my new 128K CoCo 3. I have a Radio Shack Multi-Pak Interface (MPI), cat. #26-3024. When I use a power strip to power up the computer and MPI together, everything works except my EDTASM+ *pak. I have no problem switching between other packs, but when I switch to* EDTASM+ *the screen fills with garbage. Will a new PAL chip in the MPI solve this problem? Is there a patch to upgrade OS-9 1.01 to Level II? Is the fan in the FD 501 disk drive necessary, or can I remove it? Where can I get an extension cable for my keyboard?*

Bill Irwin
Toledo, OH

℞ First, count yourself lucky that only one of your ROM packs is not compatible with the CoCo 3. The PAL chip upgrade is unrelated to this problem. You could use Roger Schrag's patches to move your *EDTASM+* code to disk. (see "Patching *EDTASM* to Run on Disk," December '82, Page 29; "Patching The Patch: *EDTASM* to Disk Revealed," April '83, Page 194; or "Superpatch for *EDTASM*," September '83, Page 66). Second, OS-9 Level I and Level II are completely different prodcts. There is no patch or upgrade available; however, you *can* use the assembler and some of the utilities from Level I with Level II. Third, the fan in the 501 is there to dissipate the heat generated from the power supply. Removing the fan could shorten the disk drive's life. Finally, Marty Goodman has contracted with several RAINBOW advertisers to sell his keyboard extender cable.

Needs a Patch

I typed in the listing for `PAKXFER` *from the December '87 issue ["Pak to Disk Transfer," Page 152]. I also looked over the patches for problem ROM packs listed in your March '88 column [Page 16]. Do you have a patch for recording the new CoCo 3 ROM Packs to disk? I am interested in recording* Thexder *and* Shanghai.

David Morrison
Brewer, ME

℞ See the August '88 "CoCo Consultations" [Page 162].

Information, Please

Where I can find extensive information on the following: CoCo's sound I/O, data transmission through the RS-232, the ROM port, CoCo 3's new machine language instructions and addressing the disk drive directly (not through ROM subroutines)?

Dave Brain
Troutdale, OR

℞ Order the CoCo 3 Service Manual (Part #MS-2603334, $15.60) from Tandy National Parts, and read Scott Honaker's "Exercise Your Drives" [RAINBOW, June '88, Page 110].

Try the Clone

I bought a copy of Xterm *because the ad said that it works with the CoCo's serial port. This may be true, but I have OS-9 Level II, which will not work with the CoCo 2.* Xterm *and* Wiz *both call for the RS-232 Pak. According to my local Radio Shack, the RS-232 Pak is no longer available. I would really like to use my OS-9 with a terminal program, but they all call for the RS-232 Pak. Is there a substitute?*

Michael E. Phelps
Belleville IL

℞ Disto is currently marketing an RS-232 SuperPack clone of the original Tandy Pak (without the virtually useless ROM-based communications software) for $49.95.

Device Descriptor Problems

I have a 512K CoCo 3 with a Multi-Pak Interface, a hard disk interface, 15-Meg hard drive, and OS-9 Level II. I can't get OS-9 to talk to the hard drive. If I boot with Level I Version 2.00 and attempt to format `/h0` *I get Error #247 (seek error). When I copy the device descriptor and device driver to a Level II disk and try to format, I get Error #237 (memory full). I don't really want to reformat the drive, but I*

Richard Esposito is the principal engineer for BDM Corporation. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

can't access any of the data already stored there. The hard drive worked fine with OS-9 Level I (both versions). My problems started after I had the Multi-Pak upgraded to work with Level II. Now that the Multi-Pak has been modified, I can't even use it with Level I! My floppy controller works fine in Slot #4 of the Multi-Pak, so I don't think the problem is in the Multi-Pak itself. Should the software be modified? I have spoken to five different people at Radio Shack stores, and no one knows what to do about this problem.

Charles Steinfeldt

℞ You need to change offset $0E of each of your hard disk device descriptors from $FF to $7F (probably `/h0` and `/dd`). The hard drive driver and descriptor for OS-9 Level II are included in the *Development System* from Radio Shack.

A Simple Sparklie Solution

Is there a simple way to address the sparklie problem that does not entail replacing the soldered-in microprocessor or the $50 GIME chip?

Juan Diaz
San Juan, PR

℞ I solved the sparklie problem (small bouncing dots on the screen during 2-Mhz operation) on my CoCo 3 by following Roger Krupski's advice. I replaced R9 and R10 (47-ohm resisters) with 100-ohm resistors and C10 and C11 (39-pF capacitors) with 47-pF capacitors. I carefully clipped the old resistors and capacitors, and I soldered the new ones onto the remaining leads — unsoldering was not required. For more information on the sparklie problem, see Marty Goodman's "Quick Fixes," October '88, Page 58.

Reprint Request

I tried to get a reprint of your article, "Disk Utilities," from CW Communications, but I did not receive a reply. Could you suggest any other way to get a reprint of this article?

Floyd Craig
Toronto, OH

℞ Try calling its business office at 1-800-441-4403.

Upgrade Prescription

I want to upgrade an early CoCo 1 D-Board to 64K. I have Color Computer Secrets Revealed *by Disk 'N Data, which shows the upgrade of later models but does not provide the directions needed to upgrade earlier models. Can you help?*

Lonnie Morosic
McCook, NE

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Figure 1

℞ See B. H. Alsop's "D-Board 64K Upgrade," RAINBOW, March '83 [Page 100]. This article offers a unique approach using modified sockets, which avoids the need to cut traces.

Hard Disk Guide

I have been considering getting a hard disk for my CoCo 2, but there are several things that I need to know before I invest $600 to $700. Does a hard disk work on the CoCo like it does on an MS-DOS computer? Is there an established hierarchy of directories like in MS-DOS or OS-9? There are several systems advertised in RAINBOW, but the ads don't give enough information about the product to help me choose a system.

Erasmo A. Martinez
Watertown NY

℞ I have been using a Seagate ST-225 20-Meg hard disk with a Western Digital controller and a Burke & Burke CoCo XT-RTC interface for over a year. It cost me around $450. OS-9 has the same hierarchical directory structure as MS-DOS, but it had it first. OS-9 was designed for — and runs well on — a hard drive. Disk BASIC, on the other hand, was designed for 35-track, single-sided floppy operation. Therefore, its hard disk operation techniques vary from using the hard drive as several floppies to modifying Disk BASIC to handle the whole drive. While OS-9's operation with a hard drive works with all of your software, Disk BASIC's operation will reveal some incompatibilities.

A Patch Explained

In your June '87 column [Page 90] you answered a question about 3½-inch drives and offered a short program patch to be used with `Modpatch`. *Near the end of the answer you stated, "You can add the missing descriptors to the modules directly and build the system directly with* `config`*." You were talking about* `/dd` *and* `/d0` *for 80-track drives. How do you do this? I have two 40-track double-sided disk drives, one 80-track, 3½-inch disk drive and* DMode *from Computerware (only for 40 tracks as far as I know). I want to get the* `Save` *command for Level II. Would you give me the patch program and the steps I need to follow. Also, is* DMode *geared for 80 tracks or do I have to buy* SDisk3*?*

E.G. Douglas
Stillwater OK

℞ If you have Kevin Darling's *DMode*, you can patch the descriptors directly on disk in your `Config Modules` directory. If you patch with `Modpatch` and then use `Save`, you'll need to know the address offsets in the descriptors (Figure 1).

You may also want to modify offset $14, which controls the step rate ($00 for 30 ms, $01 for 20 ms, $02 for 12 ms and $03 for 6 ms). Do not forget to verify. *SDisk3* is not needed if you only want to support other size drives or vary the step rate under OS-9 Level II. The Level I drivers for OS-9 were hard-coded for single-sided operation. Consequently, *SDisk*, or an equivalent, was required for two-sided operation. However, with Level II, all you need for different size drives is to modify the device descriptors.

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.

Growing Up With CoCo

Building on the skills developed in earlier games

By Fred B. Scerbo
Rainbow Contributing Editor

The last three columns have presented a series of four early-childhood education programs: *Opposites* (parts I and II) and *Match Game of Opposites* (parts I and II). From the mail I have received on the first installment, I believe that these programs will help fill a vacuum in the CoCo Community's software library.

This month, let's look at the final installment in this series. *Picture This* allows children to use all the skills developed in the first four programs and take them one step further. While some of the graphics will be the same as those in the last four programs, the `DATA` statements are *not* interchangeable. The alphanumeric part of each graphics string has been deleted. Instead, graphics text characters will be represented by an array of graphics alphanumeric strings.

Our Purpose

Why do we need this fifth program? In both the *Opposites* and *Match Game of Opposites* series, we dealt strictly with abstract concepts. We related a picture to a word and to its opposite.

In *Picture This*, the user must take this knowledge and correctly insert the correct word in each sentence. Each concept's graphic representation is still given, but this time each concept is shown individually. For each concept, a sentence with a missing word (blank) represented by the graphic is presented with a series of possible answers. The question would appear in the following format:

```
THIS LITTLE SNAIL IS
VERY . . .
   A) THICK
   B) SLOW
   C) DRY
   D) FAST
```

In this example, the screen would include our snail graphic. (So *that's* where our old friend the snail from *Snail Invaders* [February '82, Page 17] and *Snail's Revenge* [July '83, Page 138] turned up. I have promised long-time readers his return for some time.)

As with quiz programs presented in previous issues, the user needs only to press the letter representing the correct response. The program corrects and scores the responses.

Typing in the Program

This program listing is much longer than listings for the last four programs. Since you cannot use the `DATA` statements from previous months, type in the program very carefully. There are no bugs in the program. Any bugs that show up will be your own. To be safe, get RAINBOW ON TAPE or DISK for a bug-free copy.

Every data line that includes a statement also has an asterisk (*). This will be recognized as an underline in the program. I thought that indicating a blank in this manner would be more attractive than using a string of periods. Therefore, type each data line exactly as you see it.

Using the Program

When you run the program, the familiar title screen will appear. You will be asked to select a level from one to eight by pressing the appropriate number. There are a total of eighty graphics and statements, so each level will present 10 questions. Each set of 10 will be assorted randomly, but you can control the set shown by selecting the level.

As with our other quiz programs, you only need to select the letter corresponding to the correct choice. If the answer is correct, the screen will display, "Very Good." An incorrect response will cause the screen to print "Sorry!" In both cases, an arrow will flash next to the correct response.

If you press ENTER, you will move to the next screen. You may also press @ to go to the scorecard. At that point, you will be asked if you want to try again. You may then press C to continue where you left off, Y (yes) to start a new quiz or N (no) to quit.

That's all there is to it. Young users may need an adult to read the sentences. This promotes the whole educational process with your children and gives you and the kids some *fun* time together. (Learning can be fun for everyone, right?)

Conclusion

This month's listing is *very* long. Since we covered the educational theories in the last three columns, there is no need to repeat them here. I hope you find this program as useful as the ones from the last three months. They make a nice set, and they also help teach some important skills.

Once again I must thank those of you who have donated your old silver CoCos to our special needs classes. It seems that just when I think I have seen the last donation, another kind soul sends us another large box. As always, the machines are put to good use in one of our special needs classes. See you next month. ☐

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.

45	208	635	143	1170	175
105	251	705	141	1230	253
175	209	790	170	1280	84
240	252	865	145	1335	35
315	42	940	65	1380	119
395	24	990	0	1440	115
470	254	1045	230	1495	196
530	70	1115	232	END	155
580	86				

The listing: PICTURES

```
1 PCLEAR1
2 REM ***************************
3 REM *      PICTURE THIS       *
4 REM *    BY FRED B.SCERBO     *
5 REM *     60 HARDING AVE.     *
6 REM *  NORTH ADAMS,MA 01247  *
7 REM *   COPYRIGHT (C) 1988    *
8 REM ***************************
9 CLEAR1000
10 CLS0:PRINTSTRING$(64,252);
15 FORI=1TO224:READA:PRINTCHR$(A
+128);:NEXT:PRINTSTRING$(64,243)
;
20 DATA61,60,61,52,62,53,60,58,6
2,61,60,58,58,16,58,62,60,58,62,
60,21,28,30,29,21,24,29,20,30,21
,28,29
25 DATA53,,53,,58,53,,58,58,53,4
8,58,58,,58,58,,58,58,,21,,26,21
,21,16,21,16,26,21,16,21
30 DATA53,,53,,58,53,,48,,53,48,
,58,,58,58,,58,58,,,,26,,21,,21,
16,26,21,,16
35 DATA53,60,60,48,58,53,,,,53,4
8,,58,,58,62,62,56,62,60,,,26,,2
1,28,29,16,26,20,28,29
40 DATA53,,,,58,53,,,,53,48,,58,
,58,58,57,,58,,,,26,,21,,21,16,2
6,,,21
45 DATA53,,,,58,53,,58,,53,48,,5
8,,58,58,53,,58,,,,26,,21,,21,16
,26,16,18,21
50 DATA60,56,,52,60,52,60,56,,60
,56,,60,60,56,56,48,56,60,60,,20
,28,,28,24,28,20,28,16,28,28
55 PRINT@389,"   BY FRED B.SCERB
O   ";
60 PRINT@421,"  COPYRIGHT (C) 19
88  ";
65 DIM P$(80,2),A$(2),B$(10),C$(
10),A(10),N(10),B(4),C(4),D(4),E
(4),F(4),AO(10)
70 DIM L$(30),H$(80,4),AB(4)
75 FORI=1TO3:READ C(I),D(I),E(I)
```

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VIP TERMINAL

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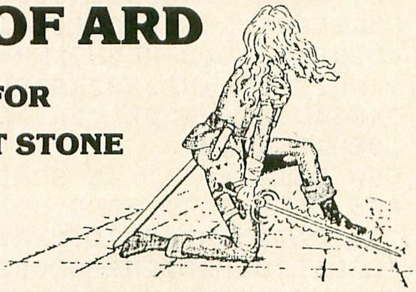
```
,F(I):NEXT:FORI=1TO30:READL$(I):
NEXT:FORI=1TO2:READA$(I):NEXT:FO
RI=1TO80:READP$(I,1),P$(I,2):FOR
LL=1TO4:READ H$(I,LL):NEXTLL:NEX
TI
80 COLOR1,0
85 GOTO180
90 KK=20
95 Z=LEN(A$):IFZ<23THENL$=A$:GOS
UB115:RETURN
100 FORI=22TO1STEP-1:IFMID$(A$,I
,1)<>" "THEN110
105 L$=LEFT$(A$,I-1):A$=RIGHT$(A
$,LEN(A$)-I):GOSUB115:KK=KK+16:G
OTO95
110 NEXTI:GOTO95
115 DRAW"C0BM0,"+STR$(KK)
120 Q=LEN(L$):FORI=1TOQ:K$=MID$(
L$,I,1):K=ASC(K$)-64
125 IFK=-32THENK=27ELSEIFK=-18TH
ENK=28ELSEIFK=-1THENK=29ELSEIFK=
-22THENK=30
130 DRAW L$(K)
135 NEXT
140 RETURN
145 DATA130,6,246,80,6,86,120,16
2,130,86,246,162
150 DATA U8R8D4NL8D4BR4,R2U8L2R8
D4NL8D4NL8BR4,NR8U8R8D2BD4D2BR4,
R2U8L2R8D8NL8BR4,NR8U4NR8U4R8BD8
BR4,U4NR8U4R8BD8BR4
155 DATA NR8U8R8BD4NL4D4BR4,U8D4
R8U4D8BR4,BR2R2U8L2R4L2D8R2BR6,B
R2NU4R8U8L4R8BR4BD8
160 DATA U8D4R4NE4F4BR4,NU8R8NU2
BR4,U8F4E4D8BR4,U8F8NU8BR4,U8R8D
8NL8BR4,U8R8D4NL8BD4BR4,U8R8D8NL
8NH4NF2BR8,U8R8D4L8R4F4BR4
165 DATA R8U4L8U4R8BD8BR4,BU8R8L
4D8BR8,NU8R8NU8BR4,BU8D4F4E4U4BD
8BR4
170 DATA NU8R6NU8R6NU8BR4,E4NH4N
E4F4BR4,BU8F4NE4D4BR8,BU8R8G8R8B
R4,BR8,BR2NU2BR8,BR2BU8U2R8D2G4B
D4L2BR8,R40BR4
175 DATA"BM2,124C0","BM130,124C0
"
180 PMODE0,1:PCLS1:SCREEN0,0:LIN
E(0,114)-(130,192),PRESET,B:LINE
(6,120)-(124,184),PRESET,B:PAINT
(2,154),0,0
185 FORI=1TO10
190 AO(I)=RND(10):IFN(AO(I))=1TH
EN190
195 N(AO(I))=1:NEXTI
200 PRINT@453,"  SELECT LEVEL (1
-8)  ";
205 X$=INKEY$:XX=RND(-TIMER):IFV
AL(X$)=0THEN205ELSEIFVAL(X$)>8TH
EN205
210 SCREEN1,1:LL=VAL(X$)*10-10:F
ORII=1TO10:DRAW A$(1):DRAWP$(AO(
II)+LL,1)
215 A$=P$(AO(II)+LL,2)+".":GOSUB
90
220 FORYY=1TO4:N(YY)=0:NEXTYY:FO
RYY=1TO4
225 AB(YY)=RND(4):IFN(AB(YY))=1T
HEN225
230 N(AB(YY))=1:IF AB(YY)=1 THEN
 FF=YY
235 NEXTYY:V=0
240 FORYY=1TO4:KK=KK+16:A$="
"+CHR$(64+YY)+". "+H$(AO(II)+LL,
AB(YY)):GOSUB95:NEXTYY
245 X$=INKEY$:IFX$=""THEN245
250 IFX$="@"THEN1510
255 V=ASC(X$):IFV<65THEN245ELSEI
FV>68THEN245
260 V=V-64:IFAB(V)=1THEN270
265 NW=NW+1:DD=KK:A$="         S
ORRY":KK=146:DRAW"S8":GOSUB95:KK
=DD:DRAW"S4":GOTO275
270 NC=NC+1:DD=KK:A$="         V
ERY":KK=146:DRAW"S8":GOSUB95:KK=
KK+26:A$="        GOOD":DRAW"S8
":GOSUB95:KK=DD:DRAW"S4"
275 V=1:IFKK=100THENKK=32ELSEIFK
K=84THENKK=16
280 KK=KK+(16*FF):KK$=STR$(KK):D
RAW"BM4,"+KK$
285 DRAW"C0R16NH4NG4":FORYY=1TO9
0:NEXTYY
290 X$=INKEY$:IFX$=CHR$(13)THEN3
00ELSEIFX$="@"THEN1510
295 DRAW"C1NH4NG4L16":FORYY=1TO9
0:NEXT:GOTO285
300 COLOR1,0:LINE(0,0)-(256,110)
,PSET,BF:LINE(8,122)-(122,182),P
SET,BF:LINE(132,122)-(256,182),P
SET,BF:NEXTII
305 FF=1:GOTO1510
310 DATA"BR60BD4F20L10D24L20U24L
10E20"
315 DATA THIS ARROW IS POINTING
*
320 DATA UP,DOWN,LEFT,RIGHT
325 DATA"BR60BD4L10D24L10F20E20L
10U24L10"
330 DATA THIS ARROW IS POINTING
*
335 DATA DOWN,UP,LEFT,RIGHT
340 DATA"BR16BD20R80M-4,+20L36M-
4,-18NL36BR12BU4E4UH4UE4BR10G4DF
4DG4BR10E4UH4UE4"
345 DATA THIS PICTURE SHOWS SOME
THING *
350 DATA HOT,COLD,DRY,WET
355 DATA"BR60BD20L4ND6L6ND2L4ND4
L2M+16,+32M+16,-32L16R4ND8R6ND4R
6L2U4H2U2H2L2H2L12G2L2G2D2G2D4"
360 DATA THIS PICTURE SHOWS SOME
```

```
THING *
365 DATA COLD,HOT,DRY,WET
370 DATA"BR50BD56R4U30R4U10R2U10
E2U4RD4F2D10R2D10R4D30R4L22BR8BU
2U24BR4D24"
375 DATA THIS BUILDING IS SOMETH
ING *
380 DATA BIG,LITTLE,THIN,WIDE
385 DATA"BR68BD52H4L4U2NR4D2L4NU
ND4L4U2L4D2R4NH6L2G4"
390 DATA THIS INSECT IS SOMETHIN
G *
395 DATA LITTLE,BIG,WIDE,THIN
400 DATA"BR24BD36E12G6F20R20E20F
6H12BL14H2G4L4H4G2BU10BL4NU4L2U6
E4R2BR26L2G4D6L2U4"
405 DATA A SMILE MEANS YOU ARE *
410 DATA HAPPY,SAD,SLEEPY,HUNGRY
415 DATA"BR34BD50H12F6E12R36F12G
6E12BU16BL28H2G4L4H4G2BU10BL4NU4
L2U6E4R2BR26L2G4D6L2U4"
420 DATA A FROWN MEANS YOU ARE *
425 DATA SAD,HAPPY,SLEEPY,HUNGRY
430 DATA"BR20BD22D20M+30,+10NU20
R50U20NL50M-30,-10ND8L50M+30,+10
M-30,-10E20R50G20L10NE20L10NE20L
10NE20L10NE20"
435 DATA THE BOX BELOW IS *
440 DATA OPEN,CLOSED,HEAVY,LIGHT
445 DATA"BR12BD16D20M+30,+10NU20
R60U20NL60M-30,-10L60M+30,+10R12
M-30,-10R12M+30,+10R12M-30,-10R1
2M+30,+10"
450 DATA THE BOX BELOW IS *
455 DATA CLOSED,OPEN,HEAVY,LIGHT
460 DATA"BR90BD52U2E8U32H4L4G2D1
0F2R4E4BL12U12H4L4G4D12F4R4E4BL1
2U12H4L4G4D12F4R4E4BL12U12H4L4G4
D12F4R4E4BL12D2G4L4M-10,-6M-10,-
2L2G4D4M+8,+4D2M+20,+12F10M+6,+2
F2BE10H10M-8,-3BD36"
465 DATA THIS SHOWS YOUR * HAND
470 DATA LEFT,RIGHT,FAT,THIN
475 DATA"BR28BD52U2H8U32E4R4F2D1
0G2L4H4BR12U12E4R4F4D12G4L4H4BR1
2U12E4R4F4D12G4L4H4BR12U12E4R4F4
D12G4L4H4BR12D2F4R4M+10,-6M+10,-
2R2F4D4M-8,+4D2M-20,+12G14G2BH10
E10M+8,-3"
480 DATA THIS SHOWS YOUR * HAND
485 DATA RIGHT,LEFT,FAT,THIN
490 DATA"BR30BD6D34R4E2U10R12F4R
12E4R12F4D12R10U20H8L18H4L4U8R12
U4L28D4R12D8L4G4L12U8H2L4BM+60,+
40F4D4G2L4H2U4E4"
495 DATA THE FAUCET SHOWN BELOW
IS *
500 DATA WET,DRY,HOT,COLD
```



THE POWER STONES OF ARD

THE QUEST FOR THE SPIRIT STONE

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VIP SPELLER

Turn the page for more VIP software!

```
505 DATA"BR30BD6D34R4E2U10R12F4R
12E4R12F4D12R10U20H8L18H4L4U8R12
U4L28D4R12D8L4G4L12U8H2L4"
510 DATA THE FAUCET SHOWN BELOW
IS *
515 DATA DRY,WET,HOT,COLD
520 DATA"BR10BD40R102L8E10M-8,+4
L6U4H2L2G4R4D4F4L20E10M-8,+4L6U4
H2L2G4R4D4F4L20E10M-8,+4L6U4H2L2
G4R4D4F4L20E20M-16,+8L12U8H4L4G8
R8BE4NLBG4D8F8BU28BR4F6NU16NE6"
525 DATA THE ARROW POINTS TO THE
 * IN LINE
530 DATA FIRST,LAST,MIDDLE,SECON
D
535 DATA"BR10BD40R102L8E10M-8,+4
L6U4H2L2G4R4D4F4L20E10M-8,+4L6U4
H2L2G4R4D4F4L20E10M-8,+4L6U4H2L2
G4R4D4F4L20E20M-16,+8L12U8H4L4G8
R8BE4NLBG4D8F8BU24BR74F6NU16NE6"
540 DATA THE ARROW POINTS TO THE
 * IN LINE
545 DATA LAST,FIRST,MIDDLE,SECON
D
550 DATA"BR56BD26S2M+36,+10F16L2
H4L4G4H4L4G4H4L4G4H4L4G6D22G2L2N
H2R2E2U22H6L4G4H4L4G4H4L4G4H4L4G
4E16M+36,-10S4BU10R10E4NH4R6E4U2
H4L10G4L12NG4H6L8G4D6F4R6F4R4E2R
2R6R4BR16NE6NR20NF6"
555 DATA THE CLOUD IS * THE UMBR
ELLA
560 DATA OVER,UNDER,AROUND,INSID
E
565 DATA"BR56BD2S2M+36,+10F16L2H
4L4G4H4L4G4H4L4G4H4L4G6D18G2L2NH
2R2E2U18H6L4G4H4L4G4H4L4G4H4L4G4
E16M+36,-10S4BD36NE6NH6NG6NF6BR1
6NE6NF6R22"
570 DATA THE MARK IS * THE UMBRE
LLA
575 DATA UNDER,OVER,AROUND,INSID
E
580 DATA"BR16BD20E2NR80R16E8R6NG
4R6NG4R6NG4R6NG4R6NG4R6NG4NG4R6N
G4R6NG4R6NG4R6NG4F8D2G8NH4L6NH4L
6NH4L6NH4L6NH4L6NH4L6NH4L6NH4L6N
H4L6NH4L6H8L16NR80"
585 DATA THIS FEATHER IS SOMETHI
NG *
590 DATA LIGHT,HEAVY,FAST,SLOW
595 DATA"BR26BD46R68M-14,-30L10U
6H4L12G4D6L10M-14,+30BR18BU8U12B
R6NR6D12R6NU12BR6U12R6D12NL6BR4N
U6BR4NU6U4R4D4L4BU22BL14L4U4R4D4
"
600 DATA THIS WEIGHT IS SOMETHIN
G *
605 DATA HEAVY,LIGHT,FAST,SLOW
610 DATA"BR60BD48R8E4U10R4U6L4U6
H4L16G4D6L4D6R4D10F4R8BU6NE4NH4B
U8NLNR2BU6BL4NR2BR6R2BU16R6E2H2L
20G2F2R12BD20BL20H16D16F16R36E16
U16G16"
615 DATA AN ANGEL IS SOMEONE WHO
 IS *
620 DATA GOOD,BAD,RICH,POOR
625 DATA"BR60BD48R8E4U10R4U6L4U6
H4L16G4D6L4D6R4D10F4R8BU10NG4NF4
BU4NLNR2BU6BL4NR2BR6R2BU12E6D8L2
0U8F6BL20D6G4L6NU10ND20L6H4U6BR7
8NG4NF4D20G10"
630 DATA A DEVIL IS SOMEONE WHO
IS *
635 DATA BAD,GOOD,RICH,POOR
640 DATA"BR20BD16D30NR56U30R6U16
R10F4G4L10D8R10D6R10D6R10D6R10D6
R10D6R26BU42BL30L20NE4NF4"
645 DATA THIS LITTLE FLAG IS * U
P
650 DATA HIGH,LOW,WINDY,SUNNY
655 DATA"BR20BD16D30NR56U30R16D6
R10D6R10D6R10D6R10D6R26L16U16R10
F4G4L10D8BU26BR6NU16NH4NE4"
660 DATA THIS LITTLE FLAG IS MUC
H *
665 DATA LOWER,HIGHER,WINDY,SUNN
Y
670 DATA"BR32BD26NR50D2NR50D2R50
D6L2D4R14U4L2U12H2U4H2U2H4L6D2F2
D2F2D8"
675 DATA A HAMMER IS SOMETHING *
680 DATA HARD,SOFT,LIGHT,DARK
685 DATA"BR36BD18H8U8R8F8E4R20F4
E8R8D8G8D10G4D2G8L2G4L8H4L2H8U2H
4U10BR10BD4R4NU2ND2NR4NE2NH2BR12
R4NU2ND2NR4NE2NH2BG8BD4NE4NH4D6N
F4NG4U6BR6NR20BL12NL20BR6D4BF4NF
10BH4BG4G10"
690 DATA A CAT IS SOMETHING *
695 DATA SOFT,HARD,HEAVY,DARK
700 DATA"BR30BD2D10NR30D4NR30L2D
4L2D4L2D4L2D12NR88D6R8NU6R8NU6R8
NU6R8NU6R8NU6R8NU6R8NU6R8NU6R8NU
6R8NU6R8U6U4H4M-10,-4L4ND10M-30,
-10NU16NE6D4M+30,+10BL58ND8NH8"
705 DATA THIS FOOT HAS A SHOE *
710 DATA ON,OFF,LEFT,RIGHT
715 DATA"BR26BD2D14L2D4L2D4L2D4L
2D12F6R20E2R30F2R14E2F2R10E2U6H2
L10H2L8M-30,-10H4U18BL18BD20G4D4
F4"
720 DATA THIS FOOT HAS A SHOE *
725 DATA OFF,ON,LEFT,RIGHT
730 DATA"BR20BD6ND20R80G10NL50M+
10,+30G4L62H4M+10,-30H4L8D14L6"
735 DATA THE PITCHER SHOWN IN *
740 DATA FULL,EMPTY,HOT,COLD
745 DATA"BR20BD6ND20R80G10M+10,+
30G4L62H4M+10,-30H4L8D14L6"
750 DATA THE PITCHER SHOWN IN *
755 DATA EMPTY,FULL,HOT,COLD
```

```
760 DATA"BR50BD14ND20R12D10NL12N
D10BR8R6NU6ND6R6BR10U18L60D36R60
U18"
765 DATA THIS GRADE IS THE *
770 DATA BEST,WORST,LONGEST,SHOR
TEST
775 DATA"BR50BD14ND20R12BD10NL12
BR8R12BR10U18L60D36R60U18BD30"
780 DATA THIS GRADE IS THE *
785 DATA WORST,BEST,LONGEST,SHOR
TEST
790 DATA"BR30BD4ND6R60D6NL60D4L6
0NU4G4D28F4R60E4U28H4BL20BD32H4L
4U2NR4D2L4NUND4L4U2L4D2R4NH6L2G4
"
795 DATA THIS SHOWS A BUG * THE
JAR
800 DATA INSIDE,OUTSIDE,OVER,UND
ER
805 DATA"BR12BD4ND6R60D6NL60D4L6
0NU4G4D28F4R60E4U28H4BR36BD32H4L
4U2NR4D2L4NUND4L4U2L4D2R4NH6L2G4
"
810 DATA THIS SHOWS A BUG * THE
JAR
815 DATA OUTSIDE,INSIDE,OVER,UND
ER
820 DATA"BR16BD30NR30U2NR30U2R18
BR4R2BR4R2BL30U2R90G12M-48,+4U10
"
825 DATA THIS CARVING KNIFE IS *
830 DATA SHARP,DULL,SOFT,HARD
835 DATA"BR16BD30NR40H2U4E2R40ND
8R48F2D2G2L2G2L2G2L36H2"
840 DATA THIS BUTTER KNIFE IS *
845 DATA DULL,SHARP,SOFT,HARD
850 DATA"BR22BD6R30D6F4R8E4U6R30
D16L8NU16L8D26L22NU30L22U26L8NU1
6L8U16"
855 DATA THIS NEW SHIRT IS *
860 DATA CLEAN,DIRTY,WET,HEAVY
865 DATA"BR22BD6R30D6F4R8E4U6R30
D16L8NU16L8D26L8NU12L4NU20L2NU8L
4NU6L4NU30L8NU12L4NU20L2NU8L4NU6
L2NU18L2U26L8NU16L8U16"
870 DATA THIS OLD SHIRT IS VERY
*
875 DATA DIRTY,CLEAN,WET,HEAVY
880 DATA"BR20BD30NR84"
885 DATA THE SURFACE OF THIS LIN
E IS *
890 DATA SMOOTH,ROUGH,WET,DRY
895 DATA"BR14BD30BRE4R4F4R4E4R4F
4R4E4R4F4R4E4R4F4R4E4R4F4R4E4R4F
4"
900 DATA THE SURFACE OF THIS LIN
E IS *
905 DATA SMOOTH,ROUGH,WET,DRY
910 DATA"BR24BD10R20F10L20NH10R6
0M+20,+8BL20NL60BR20M-20,+8L60G1
0R20E10L20U16BL8NL16BD4NL16BD4NL
16BD4NL16BD4NL16"
915 DATA THIS BIG ROCKET IS VERY
 *
920 DATA FAST,SLOW,THICK,DRY
925 DATA"BR42BD44NR30H10U10E10R2
0F8D10G4L16H6U4E4R8F4D2G2L4H2BD8
R16E6R6NE6F4D4NL4G4L6BU8BR4R"
930 DATA THIS LITTLE SNAIL IS VE
RY *
935 DATA SLOW,FAST,THICK,DRY
940 DATA"BR32BD4R60D46L60U46BF2R
10NF4R18ND6R18NG4R10D5NG4D16NL6D
16NH4D5L10NH4L18NU6L18NE4L10U5NE
4U16NR6U16NF4U5BD23BR28F8U2H8NU2
M-18,-4"
945 DATA THE TIME SHOWN IS * THE
 HOUR
950 DATA BEFORE,AFTER,AROUND,UND
ER
955 DATA"BR32BD4R60D46L60U46BF2R
10NF4R18ND6R18NG4R10D5NG4D16NL6D
16NH4D5L10NH4L18NU6L18NE4L10U5NE
4U16NR6U16NF4U5BD23BR28F8U2H8NU2
M+18,-4"
960 DATA THE TIME SHOWN IS * THE
 HOUR
965 DATA AFTER,BEFORE,AROUND,UND
ER
```

VIP WRITER

VIP Writer

RATED "BEST" IN SEPT '88 "RAINBOW"

VIP Writer has all the features of VIP Writer III described elsewhere in this magazine except the screen widths are 32, 51, 64 & 85. Screen colors are black, green and white, double clock speed is not supported, Spooler is unavailable. Hard disk is not supported. Even so, VIP Writer is the BEST word processor for the CoCo 1 & 2! VIP Writer includes VIP Speller AT NO ADDITIONAL COST. **DISK $69.95**

VIP Database

"ONE OF THE BEST" JULY 1984 "RAINBOW"

VIP Database has all the features of VIP Database III described elsewhere in this magazine except the screen widths are 51, 64 & 85. Screen colors are black, green and white, double clock speed is not supported, Spooler is unavailable. Even so, VIP Database is the most complete database for the CoCo 1 & 2! **DISK $49.95**

VIP DATABASE

Turn the page for more VIP software!

```
970 DATA"BF30E8R2E2NH6R2E2R4E2NH
6R6E2R6NH6R4F2R6F2R4NH8F2R2F2R2F
8H2L2G2L2G2L4G2L6G2L20H2L6H2L4H2
L2H2NL2F2R2F2R4F2R6H4U2H2U4E2BR3
0F2D4G2D2G4BU4BL10U8F2D4L4U6D8H2
U4"
975 DATA THIS EYE LOOKS LIKE IT
IS *
980 DATA AWAKE,ASLEEP,LISTENING,
TALKING
985 DATA"BF24BR4F2R2F2NG6R2F2R6F
2NG6F2R8NG6R8E2R6NG8E2R4E2R2E2R2
NG10E2BU20BL70R10G10R10BR6RBR6RB
R6NR10E10NL10BD10BR6RBR6RBR6NR10
E10NL10BD10BR6RBR6R"
990 DATA THIS EYE LOOKS LIKE IT
IS *
995 DATA ASLEEP,AWAKE,LISTENING,
TALKING
1000 DATA"BD6BF38R8E4U10R4U6L4U6
H4L16G4D6L4D6R4D10F4R8BU6NE4NH4B
U8NLNR2BU6BL4NR2BR6R2BR40BD20R8E
4U10R4U6L4U6H4L16G4D6L4D6R4D10F4
R8BU6NE4NH4BU8NLNR2BU6BL4NR2BR6R
2"
1005 DATA THIS PERSON IS * A FRI
END
1010 DATA WITH,WITHOUT,HAPPY,SAD
1015 DATA"BR60BD44R8E4U10R4U6L4U
6H4L16G4D6L4D6R4D10F4R8BU6NE4NH4
BU8NLNR2BU6BL4NR2BR6R2"
1020 DATA THIS PERSON IS * A FRI
END
1025 DATA WITH,WITHOUT,HAPPY,SAD
1030 DATA"BR60BD50R8E4U10R4U6L4U
6H4L16G4D6L4D6R4D10F4R8BU6NE4NH4
BU8NLNR2BU6BL4NR2BR6R2BU12NL12R4
U2NL16U2NL30R14L2D8NF2NG2"
1035 DATA THIS IS SOMEONE WHO IS
 VERY *
1040 DATA WISE,FOOLISH,STRONG,WE
AK
1045 DATA"BR60BD50R8E4U10R4U6L4U
6H4L16G4D6L4D6R4D10F4R8BU10NG4NF
4BU4NLNR2BU6BL4NR2BR6R2BU10R6M-1
0,-20M-10,+20"
1050 DATA THIS IS SOMEONE WHO IS
 VERY *
1055 DATA FOOLISH,WISE,STRONG,WE
AK
1060 DATA"BRBD26BR24R76M-30,-10L
4G4L4H4L4M-30,+10D2M+30,+6R4E2R8
F2R4M+30,-6"
1065 DATA THIS IS PART OF A * FA
CE
1070 DATA PRETTY,UGLY,FAT,THIN
1075 DATA"BD22BR20NE4NG4R76NH4NF
4G12L52H12F6R10NU6ND6R10NU6ND6R2
NU6R2NU6R2NU6R2NU6ND6R10NU6ND6R2
ND6R2ND6R2ND6R2ND6NU6R10NU6ND6R6
"
1080 DATA THIS IS PART OF AN * F
ACE
1085 DATA UGLY,PRETTY,FAT,THIN
1090 DATA"BR16BD20R80M-4,+20L36M
-4,-18NL36E4R36H2L32R12U4R8D4BD4
2"
1095 DATA THIS IS A PAN WHICH IS
 *
1100 DATA COVERED,UNCOVERED,HOT,
COLD
1105 DATA"BR16BD20R80M-4,+20L36M
-4,-18NL36BU8BE4R36H2L32R12U4R8D
4"
1110 DATA THIS IS A PAN WHICH IS
 *
1115 DATA UNCOVERED,COVERED,HOT,
COLD
1120 DATA"BD2BR56F12D4G2L4D2F2D2
M-16,+4M+12,+3F2D2G4D4G2L14G2D4B
E20BR12NR26BD4M+20,+6BU20M-20,+6
BH18L4F2"
1125 DATA THIS SHOWS SOMEONE *
1130 DATA TALKING,LISTENING,SEEI
NG,FEELING
1135 DATA"BD18BR94U4H4L4NU8L8G4D
2G2D12F2DF8R4ND6R6E4BH6L4H2U4BL2
8BD20E2R2E2U4E2U20H2U4H2L2H2BL12
BD34E2R2E2U4E2U10H2U4H2L2H2BL12B
D28E2R2E2U4E2U4H2U4H2L2H2BL12BD4
NF6D14L6F2L2"
1140 DATA THIS SHOWS SOMEONE *
1145 DATA LISTENING,TALKING,SEEI
NG,FEELING
1150 DATA"BR30BD8NE4NU8NH4BL8D10
NR60D20NR60D10R60BR6F4H2G2E4BR6U
20NL60U20L60"
1155 DATA THE MARK IS AT THE *
1160 DATA START,FINISH,SIDE,MIDD
LE
1165 DATA"BR20BD8D10NR60D20NR60D
10R60BR6F4H2G2E4BR6U20NL60U20NL6
0D40BR6NE4NR8NF4"
1170 DATA THE MARK IS AT THE *
1175 DATA FINISH,START,SIDE,MIDD
LE
1180 DATA"BR44BD4R6F4R2E4R2F4R2E
4R6G8L20NH8D4R20NU4F12D14G6L30H6
U14E12BF6BD4NR8L4D6R12D6L12R6ND4
NU16"
1185 DATA THIS MEANS SOMEONE IS
*
1190 DATA RICH,POOR,TALL,SHORT
1195 DATA"BR58BD6R6F2R2F2R2F4R2F
4D4F2D6G2D4G4L2G4L2G2L2G2L12H2L2
H2L2H4L2H4U4H2U6E2U4E4R2E4R2E2R2
E2R4BD12BL2NG4D16L4R8BR8BU4U4R2L
6U4R6L2U4"
1200 DATA SOMEONE WITH JUST THIS
 IS *
1205 DATA POOR,RICH,TALL,SHORT
1210 DATA"BR36BD20R50D30L50U30BF
6ND16BR4ND16BR4ND16BR4ND16BR4ND1
6BR4ND16BR4D16BD4NL24BR8BU4R4U2L
```

```
4U2R4BU6L4U2R4U2L4BR32BU18M-14,+
6BL12NE8BL10NE8BL10NU8BL10NH8BL1
2NH8BL12M-14,-6"
1215 DATA THIS RADIO IS VERY *
1220 DATA NOISY,QUIET,BRIGHT,DAR
K
1225 DATA"BD2BR36F12D4G2L4D2F2D2
G4NL10F2D2G4D4G2L14G2D4BR28U24E4
R2F4D10E2R2F2E2R2F2E2R2F2D10G4BU
20BL8R6U4L6U4R6BR6D8U4R8U4D8BR6U
8D4R8U4D8BR4R2BR4R2BU20BL80L6"
1230 DATA THIS MEANS TO BE *
1235 DATA QUIET,NOISY,BRIGHT,DAR
K
1240 DATA"BR40BD2R44F4D2M-8,+20G
8L4D4F4NL20D6L20U6E4U4L4H8M-8,-2
0U2E4BD4BR2G2M+6,+16R2U18NL4BR28
D18R2M+6,-16H2L4BL22BD4NG2D16NL2
R2BR2BU6R4U4L4U4R4BR4R2ND8R2"
1245 DATA THIS IS A SIGN OF *
1250 DATA WINNING,LOSING,SLEEPIN
G,READING
1255 DATA"BR34BD16R6U4L6U4R6BR4N
R6D8R6BR4U8R6D8NL6BR4U8R6D4L6R2F
4BR4NR6U4NR6U4R6BD20BL50D10R10U1
0NL10BR6BD4R6BR10BD6R4NR4U10NG4B
R10D10R10U10L10BF18L74U44R74D44"
1260 DATA THIS IS A SIGN OF *
1265 DATA LOSING,WINNING,SLEEPIN
G,READING
1270 DATA"BR62BD36R8E4U10R4U6L4U
6H4L16G4D6L4D6R4D10F4R8BU10NG4NF
4BU4NLNR2BU6BL4NR2BR6R2BD10BF8M-
12,+18M-12,-18BU24BR38D30R4U30L4
U6R12D2R8F6D4L4H4L6U2L10BL50BD8L
22D2NR22R2D4F6G6D4L2NR22D2R22U2L
2U4H6E6U4"
1275 DATA THIS IS SOMEONE WHO IS
 *
1280 DATA OLD,YOUNG,TALL,SHORT
1285 DATA"BR60BD44R8E4U8R4U6L4U6
H4L16G4D6L4D6R4D8F4R8BU6NE4NH4BU
8NLNR2BU6BL4NR2BR6R2BU8U2H2L4BR2
6BD6R10D20L10U20E2R6L2U2L2BL58BD
4L2G2D4F2R2D10G2D2F2E2U2H2U10R2E
2U4H2L2"
1290 DATA THIS IS SOMEONE WHO IS
 *
1295 DATA YOUNG,OLD,TALL,SHORT
1300 DATA"BR18BD4R60D46L60U46BF2
R10NF4R18ND4R18NG4R10D5NG4D16NL6
D16NH4D5L10NH4L18NU6L18NE4L10U5N
E4U16NR6U16NF4U5BD23BR28F8U2H8NU
2U12BR40ND8R12D4NL12D4BD8ND8G6H6
D8"
1305 DATA THIS TIME IS VERY *
1310 DATA EARLY,LATE,LONG,SHORT
1315 DATA"BR18BD4R60D46L60U46BF2
R10NF4R18ND4R18NG4R10D5NG4D16NL6
D16NH4D5L10NH4L18NU6L18NE4L10U5N
```

MJK & MJK3 DOS

RAINBOW CERTIFICATION SEAL

WHY BUY ADOS 3
WHEN YOU CAN HAVE THIS

New: MJK-DOS for COCO 1, 2, and 3 $39.95
Most powerfull operating system for the CoCo ever! Allows up to 3 DS-80 track drives or standard drives. The DS-80 drives are software configurable to standard Radio Shack* format in order to maintain compatibility. Allows global file name specification with wildcards. All the files will be displayed alphabetically, including the date that the file was saved. Use one command to KILL or COPY a number of files that meet the global filename specification (can be a full disk!) in one run or one at a time upon user prompt (Y-key). Use the powerfull CHAIN command to use programs of any length. Use the built in FULL SCREEN EDITOR to allow fast and easy program modification. You can even use the TRON command that will put you (after an error) in the modified line editor or get the automatic error trap routine with fully spelled out error names. Hit one key to repeat the last command. You will also get error trap, repeat key, AUTO, DATE, CAT (two columns of directory with only the filenames & extensions), WAIT, RUNM, BAUD, FIND, OLD, DATE$, (string in basic program), LCOPY (groups of basic lines), REPL (to replace a string), TYPE (list a text file on screen/printer), SPLIT or JOIN basic lines, SAY for real spoken text, word peek & poke and many more.... MJK-DOS is primarily intended for double-sided 80-track drives (720K each)
ALLOWS YOU TO READ/WRITE/FORMAT 35/40 DISKS ON A 80T DRIVE
******** EPROMABLE ****** **** FREE UPDATES FOR 1 YEAR ****

MJK512 DOS(COCO3-512K) BUILT IN RAM DISK AND RAM TEST COMMANDS	$49.95
Monitor-Disassembler (COCO 1, 2&,3)	$39.95
Source-Code Generator/LabelGenerator (COCO1,2&,3)	$49.95
JB REMOTE rs-232 pack driver for bbs etc. (COCO1,2,&3)	$19.95
NEWKEY (COCO3) new key scan--gives you true ALT & CTRL	$15.00
NEWKEY232(COCO3)--JB REMOTE and NEWKEY in one package	$25.00
RTC -real time hardware clock for the coco 1,2,&3	$35.00

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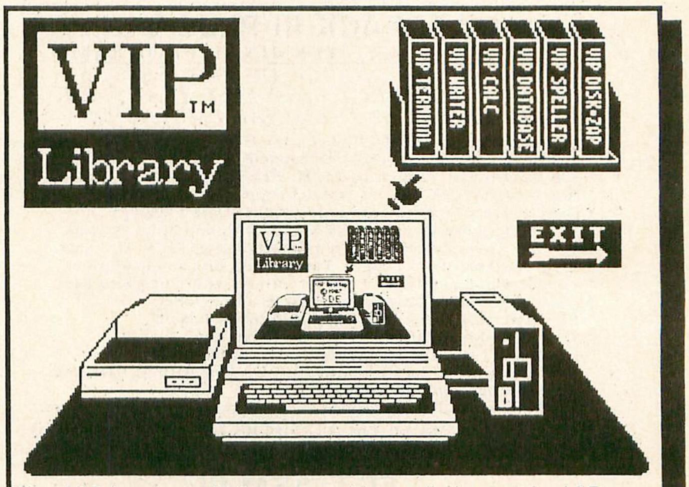

The VIP Integrated Library combines all six popular VIP programs - VIP Writer*, Speller, Calc, Database*, Terminal and Disk-Zap - into one program on one disk. The program is called VIP Desktop. From the desktop you have instant access to word processing with a spelling checker always in attendance, data management with mail-merge, spreadsheet financial analysis, telecommunications and disk maintenance. Just move the hand to the volume on the bookshelf and the application is there. 64K req'd. $149.95

CoCo 3 owners: See our FULL PAGE AD!

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*** *** *** *** COLOR COMPUTER III SOFTWARE *** *** *** ***

CBASIC III EDITOR/COMPILER

The ULTIMATE Color Computer III BASIC COMPILER!!!

If you want to write fast efficient machine language programs and you don't want to spend the next few years trying to learn how to write them in Assembly language or with a cheap compiler, then CBASIC III is the answer!!!

CBASIC III is the only fully integrated Basic Compiler and Program Editing System available for the Color Computer 3. It will allow you to take full advantage of all the capabilities available in your CoCo-3 including 512K RAM, without having to spend years trying to learn assembly language programming. CBASIC III allows you to create, edit and convert programs from a language you are already familiar with Enhanced Disk Color Basic, into fast efficient machine language programs easily and quickly. CBASIC III supports all the enhanced hardware available in the CoCo-3, including Hi-Res Graphics, & Screen displays, Extended Memory and Interrupts (Keyboard, Timer, Serial & Clock). We even added advanced commands not available in Basic to give you a level of control only avialable to very advanced Machine Language Programmers. Plus we made it exceptionally easy to use, not like some other compilers. CBASIC III is the friendliest and easiest compiler available for the Color Computer III.

CBASIC III is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocations and so on, because CBASIC III will handle it for you automatically. For Advanced users, CBASIC III will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC III features well over 150 Compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. It supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Enhanced Color Basic, including Graphics *H/GET*, *H/Put*, *H/Play* and *H/DRAW*, all with 99.9% syntax compatibility. CBASIC III also supports the built in Serial I/O port with separate programmable printer & serial I/O baud rates. You can send and receive data with easy to use PRINT, INPUT, INKEY, GETCHAR and PUTCHAR commands.

CBASIC makes full use of the powerful and flexible GIMI chip in the Color Computer 3. It will fully utilize the 128K of RAM available and install 2 Ultra Fast Ramdisks if 512K is available, for program Creation, Editing and Compilation. You can easily access all 512K of memory in a Compiled program thru several extended memory commands that can access it in 32K or 8K blocks and single or double bytes.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing Basic programs. It has block move and copy, program renumbering, automatic line number generation, screen editing, printer control and much more.

The documentation provided with CBASIC III is an 8 1/2 by 11 Spiral Bound book which contains approximatly 120 pages of real information. We went to great lengths to provide a manual that is not only easy to use and understand, but complete and comprehensive enough for even the most sophisticated user.

CBASIC III is the most expensive Color Basic Compiler on the market, and well worth the investment. You can buy a less expensive compiler for your CoCo-3, and then find out how difficult it is to use, or how limited its features are. Then you'll wish you had bought CBASIC III in the first place. Dollar for dollar, CBASIC III gives you more than any other compiler available. If you can find a better CoCo-3 Basic Compiler then buy it!!!

Requires 128K & Disk $149.00

DATAPACK III PLUS V1.1

SUPER SMART TERMINAL PROGRAM

AUTOPILOT & AUTO-LOG PROCESSORS
X-MODEM DIRECT DISK FILE TRANSFER
VT-100 & VT-52 TERMINAL EMULATION

- No lost data even at 2400 Baud on the COCO-3 Serial I/O port.
- 8 Display Formats, 32/40/64/80 columns at 192 or 225 Res.
- 50K Text Buffer when using the Hi-Res Text Display & Disk.
- ASCII & BINARY disk file transfer support via XMODEM.
- Directly record receive data to a disk file (Data Logging).
- VT-100 terminal emulation for VAX, UNIX and other systems.
- VT-100/52 cursor keys, position, insert/delete, PF & Alt. keys.
- Programmable Word Length, Parity, Stop Bits and baud rates.
- Complete Full and Half Duplex operation, with no garbled data.
- 9 Variable length, Programmable Macro Key buffers.
- Programmable Printer rates from 110 to 9600 baud.
- Send Files directly from the Buffer, Macro Keys or Disk.
- Display on Screen or Print the contents of the Buffer.
- Freeze Display & Review information On Line with no data loss.
- Built in Command Menu (Help) Display.
- Built in 2 Drive Ramdisk for 512K RAM support and much more.

Supports: R.S. Modem-Pak & Deluxe RS-232 Pak, even with Disk.

Requires 128K & Disk, $59.95

EDT/ASM III

128/512K DISK EDITOR ASSEMBLER

EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is designed to take advantage of the new features available in the CoCo-3 with either 128K or 512K of memory. It has 8 display formats from 32/40/64/80 columns by 24 lines in 192 or 225 Resolution, so you use the best display mode whether you are using an RGB or Composite monitor or even a TV for your display. Plus you can select any foreground or background colors or even monochrome display modes. It will even support 512K by adding an automatic 2 drive Ultra Fast Ramdisk for lightning fast assembly of program source code larger than memory. There is also a free standing ML Debug Monitor, to help you debug your assembled programs. EDT/ASM III has the most powerful, easy to use Text Editor available in any Editor/Assembler package for the Color Computer.

- Supports Local and Global string search and/or replace.
- Full Screen line editing with immediate line update.
- Easy to use Single keystroke editing commands.
- Load & Save standard ASCII formatted file formats.
- Block Move & Copy, Insert, Delete, Overtype.
- Create and Edit files larger than memory.

The Assembler portion of EDT/ASM III features include:

- Supports the full 6809 instruction set & cross assembles 6800 code.
- Supports Conditional IF/THEN/ELSE assembly.
- Supports Disk Library file (include) up to 9 levels deep.
- Supports standard Motorola assembler directives.
- Allows multiple values for FCB & FDB directives (unlike R.S. EDT/ASM)
- Allows assembly from the Editor Buffer, Disk or both.

Requires 128K & Disk $59.95

TEXTPRO IV

"The ADVANCED COCO-3 Word Processing System"

- 9 Hi-Res Displays from 58 to 212 columns by 24 lines in 225 Res.
- On Screen Display of Bold, Italic, Underline & Double Width print.
- Up to 8 Proportional Character Sets Supported with Justification.
- Up to 80 Programmable Function Keys & Loadable Function key sets.
- Fully Buffered keyboard accepts data even duiring disk access.
- Autoexecute Startup files for easy printer & system configuration.
- 8 Pre-Defined Printer function commands & 10 Programmable ones.
- Supports Library files for unlimited printing & configurations.
- Disk file record access for Mail Merge & Boiler Plate printing.
- Completely Automatic Justification, Centering, Flush left & right.
- Change indents, margins, line length, etc. anytime in the text.
- Create and Edit files larger than memory, up to a full disk.
- Easily imbed any number of printer format and control codes.
- Built in Ultra Fast 2 drive RAMDISK for 512K support.

TEXTPRO IV is the most advanced word processing system available for the COCO-3, designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, and never expect to use multiple fonts or proportional spacing, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formatting problems and letter writing, then TEXTPRO IV is what your looking for. It works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 70 different formatting commands you can use without ever leaving the text your working on. There are no time consuming, and often frustrating menu chases, you are in total control at all times. You can see what the formatted document will look like before a single word is ever printed on your printer. Including margins, headers, footers, page numbers, page breaks, column formatting, justification, and Bold, Italic, Underline, Double Width, Superscript and Subscript characters right on the screen.

TEXTPRO IV can even support LASER PRINTERS with proportional fonts, take a good look at this AD? It was done with TEXTPRO IV on an OKIDATA LASERLINE-6 laser printer!!! All the character sets used on this AD are proportional spaced characters, all centering, justification, and text printing was performed automatically by TEXTPRO IV.

Requires 128K & Disk $89.95

HI-RES III Screen Commander

The DISPLAY you wanted but didn't get on your CoCo-3

- 54 Different Character Sizes available from 14 to 212 cpl.
- Bold, Italic, Underline, Subscript, Superscript and Plain character styles.
- Double Width, Double Height and Quad width characters.
- Scroll Protect form 1 to 23 lines on the screen.
- Mixed Text & Graphics in HSCREEN 3 mode.
- PRINT @ is available in all character sizes & styles.
- Programmable Automatic Key repeat for fast editing.
- Full Control Code Keyboard supported.
- Selectable Character & Background color.
- Uses only 4K of Extended (2nd 64K) or Basic RAM.
- Written in Ultra Fast Machine Language.

HI-RES III will improve the standard display capabilities of the Color Computer 3, even the 40 and 80 column displays have several features missing. For example, you can't use PRINT @ or have different character sizes on the same screen, even when mixing text and graphics with the HPRINT command. Hi-RES III can give you the kind of display you always dreamed about having on your CoCo-3, with a wide variety of display options that you can easily use with your Basic or ML programs.

HI-RES III is totally compatible with Enhanced Color Basic and its operation is invisible to Basic. It simply replaces the normal screen display with an extremely versatile display package. With the full control code keyboard, you can control many of HI-RES III extended functions with just a couple of simple keystrokes.

Requires 128K Tape or Disk $34.95

512K RAMDISK & MEMORY TESTER

RAMDISK is an ALL Machine Language program that will give you 2 ULTRA High Speed Ram Disks in you CoCo-3. It does not need or require the OS-9 operating system. It works with R.S. DOS V1.0 or V1.1 and it is completely compatible with Enhanced Color Disk Basic! Plus it allows your CoCo-3 to run at double speed all the time even for floppy disk access!!! It will not disappear when you press reset like some other ramdisk programs. The MEMORY tester is a fast ML program to test the 512K ram. It performs several bit tests as well as an address test so you know that your 512K of memory is working perfectly.

Requires 512K & Disk $19.95

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DISASSEMBLER & SOURCE CODE GENERATOR

The SOURCE III will allow you to easily Disassemble Color Computer machine language programs Directly from Disk and generate beautiful, Assembler compatible Source code.

- Automatic label generation and allows specifying FCB, FDB and FCC areas.
- Disassemble programs Directly from disk, unlike other disassemblers.
- Automatically locates Begin, End and Execution address.
- Output Disassembled listing with labels to the Printer, Screen or both.
- Generates Assembler source files directly to disk or printer.
- Built in Hex/Ascii dump/display to locate FCB, FCC & FDB areas.
- 8 Selectable Display formats 32/40/64/80 columns in 192 or 225 Res.
- Selectable Foreground & Background colors & Printer Baud rates.
- Built in Disk Directory an Kill file commands.
- Menu display with single key commands for smooth, Easy operation.
- Written in Ultra Fast Machine Language.

Requires 128K & Disk $49.95

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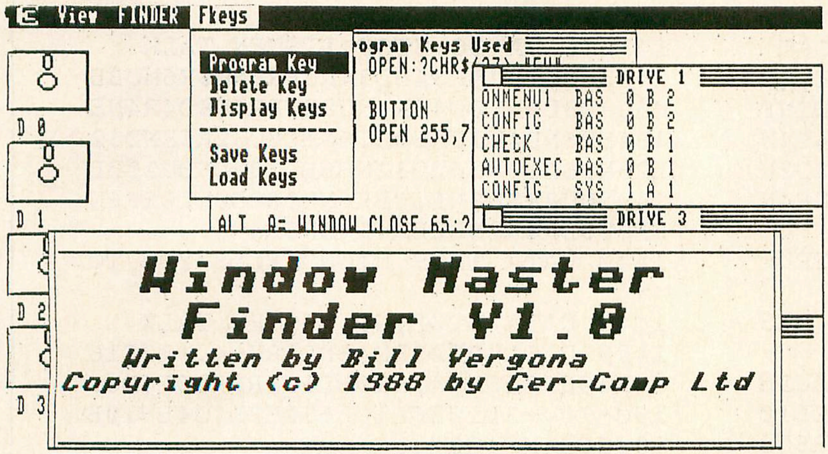
"Window Master"



```
ogram Keys Used
 OPEN:?CHR$(27);"EW"
 BUTTON
 OPEN 255,7
ALT  A= WINDOW CLOSE 65:2

DRIVE 1
ONMENU1  BAS  0 B 2
CONFIG   BAS  0 B 2
CHECK    BAS  0 B 1
AUTOEXEC BAS  0 B 1
CONFIG   SYS  1 A 1
DRIVE 3

Window Master
Finder V1.0
Written by Bill Vergona
Copyright (c) 1988 by Cer-Comp Ltd
```

Screen Display Fonts

Window Master supports up to 54 different character sizes on the screen with 5 different character styles. You can have Bold, Italic, Underlined, Super-Script, Sub-script or Plain character styles or any combination of them in any character size. You can also change the text color and background at any time to get really colorful displays.

Fully Basic Compatible

Window Master is fully compatible with Enhanced Color Disk basic with over 50 Commands & functions added to fully support the Point & Click Window System. Window Master does not take any memory away from Basic, so you still have all the Basic Program memory available.

Hi-Resolution Displays

Window Master uses the full potential of the Color Computer 3 display by using the 225 vertical resolution display modes instead of the 192 or 200 resolution modes like most other programs. It uses either the 320/16 color mode or the 640/4 color display to give you the best display resolution possible, and can be switched to either mode at any time.

Mixed Text & Graphics

Window Master fully supports both Text & Graphics displays and even has a Graphics Pen that can be used with HLINE, HCIRCLE, HSET and more. You can change the Pen width & depth and turn it on or off with simple commands. We also added Enhanced Graphics Attributes that allow graphics statements to use And, Or, Xor and Copy modes to display graphic information. With the Graphics enhancements added by Window Master, you could write a "COCOMAX" type program in Basic! In fact we provide a small graphics demo program written in Basic.

Event Processing

Window Master adds a powerful new programming feature to Basic that enables you to do "Real Time" Programming in Basic. It's called Event Trapping, and it allows a program to detect and respond to certain "events" as they occur. You can trap Dialog activity, Time passage, Menu Selections, Keyboard activity and Mouse Activity with simple On Gosub statements, and when the specified event occurs, program control is automatically routed to the event handling routine, just like a Basic Gosub. After servicing the event, the sub-routine executes a Return statement and the program resumes execution at the statement where the event occured.

Enhanced Editing Features

Window Master adds an enhanced editor to Basic that allows you to see what you edit. It allows you to insert & delete by character or word, move left or right a word or character at a time, move to begin or end of line, toggle automatic insert on/off or just type over to replace characters. The editor can also recall the last line entered or edited with a single key stroke. You can even change the line number in line to copy it to a new location in the program.

Window Master Features

Multiple Windows

Window Master supports multiple window displays with up to a maximum of 31 windows on the screen. Overlapping windows are supported, and any window can be made active or brought to the top of the screen. Windows can be picked up and moved anywhere on the screen with the mouse. There are 6 different Window styles to choose from and the window text, border and background color is selectable.

Pull Down Menus

Menus are completely programmable with up to 16 menus available. They can be added or deleted at any time in a program. Menu items can be enabled, disabled, checked or cleared easily under program control. Menu selection is automatically handled by Window Master & all you have to do is read a function variable to find out which menu was selected.

Buttons, Icons & Edit Fields

Each Window can have up to 128 buttons, Icons or Edit fields active, if you can fit that many. Buttons, Icons and Edit field selection is handled automatically by Window Master when the mouse is clicked on one. All you have to do is read a Dialog function to find out which Button, Icon, or Edit field was selected, its very simple.

Mouse & Keyboard Functions

Window Master automatically handles the Mouse pointer movement, display and button clicks. It will tell you the current screen coordinate, the local window coordinate, window number the mouse is in, the number of times the button was pressed, which window number it was clicked in and more. The Keyboard is completely buffered, and supports up to 80 programmable Function keys that can contain any kind of information or command sequences you can imagine. You can load and save function key sets at any time. So, you can have special sets of function keys for different tasks. The "Ctrl" key is supported so that you have a full control code keyboard available.

Window Master Applications

Window Master pushes the Color Computer 3 far beyond its normal capabilities, into the world of a "User Friendly" operating enviornment. We are already planning several new programs for use with Window Master. So you don't have to worry about having to write all your own programs. And don't forget that many existing Basic and M.L. programs will run under Window Master with little or no changes. The Possibilities for Application programs are endless: Spread Sheets, Word Processing, Communications, Education, Games, Graphic Design, Desk Top Publishing and on and on.

Hardware Requirements

Window Master requires 512K of memory, at least 1 Disk Drive, a Hi-Res Joystick Interface and a Mouse or Joystick.

Technical Assistance

If you run into difficulty trying to use some of Window Master's features, we will be happy to assist you in any way possible. You can write to us at the address below or call us between 10am and 2pm Pacific Standard Time for a more timely response. Sorry, no collect calls will be accepted.

Ordering Information

To order WINDOW MASTER by mail, send check or money order for $69.95, plus $3.00 for shipping & handling to the address below. To order by VISA, MASTERCARD or COD call us at (702)-452-0632
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```
E4U16NR6U16NF4U5BD23BR28H8U2F8NU
2U12BR40ND8R12D4NL12BD4BD8ND8G6H
6D8"
1320 DATA THIS TIME IS VERY *
1325 DATA LATE,EARLY,LONG,SHORT
1330 DATA"BR12BD40R100L14BU2E2NR
6U2H2L2G2D2NF2L14NG2U2H2L2G2D2NF
2L10U4R4U2E6R20F4R10D8NR2BL54L4N
G2U2H2L2G2D2NF2L14NG2U2H2L2G2D2N
F2L10U20R28D6R6D6R8ND8BE22D8NE4N
H4"
1335 DATA YOUR CAR IS * THE TRUC
K
1340 DATA IN FRONT OF,BEHIND,BES
IDE,UNDER
1345 DATA"BR12BD40R98L8BU4NG2U2H
2L2G2D2NF2L14NG2U2H2L2G2D2NF2L10
U20R28D6R6D6R8D8L4BL56BD2E2NR6U2
H2L2G2D2NF2L14NG2U2H2L2G2D2NF2L1
0U4R4U2E6R20F4R10D8NR2BH22NU8NH4
NE4"
1350 DATA YOUR CAR IS * THE TRUC
K
1355 DATA BEHIND,IN FRONT OF,BES
IDE,UNDER
1360 DATA"BR12BD40R100L64BU2E2NR
6U2H2L2G2D2NF2L14NG2U2H2L2G2D2NF
2L10U4R4U2E6R20F4R10D8R2BD4R8U24
NG4U4NR44L8E12NR40BG16BL12NL14NH
4NG4"
1365 DATA THE CAR WILL * THE GAR
AGE
1370 DATA ENTER,EXIT,SURROUND,HI
T
1375 DATA"BR12BD40R100L14BU2E2NR
6U2H2L2G2D2NF2L14NG2U2H2L2G2D2NF
2L10U4R4U2E6R20F4R10D8NR2BD4L52U
24NF4U4NL44R8H12NL40BF16BR12R14N
H4NG4"
1380 DATA WATCH THE CAR * THE GA
RAGE
1385 DATA EXIT,ENTER,SURROUND,HI
T
1390 DATA"BR30BD24ND10F10M+28,-8
R10F10G4NL10G6L10M-28,-8G10U10U2
BR36NH4NG4BR10BU4R2BR12R2BU6R2BU
6R2BU6R2BU10BR4NF4G4L8H4G4L8H4G4
L8H4G4L8H4G4L8H4G4"
1395 DATA THIS FISH IS *
1400 DATA ALIVE,DEAD,TASTY,AWFUL
1405 DATA"BR30BD24ND20F10NG10R6N
U4ND4R6NU6ND6R6NU8ND8R6NU8ND8R6N
U8ND8R6ND8U8R4F8G4NL4G4L4BU22BL1
0E2U2H2U2E2U2H2U2BL12D2F2D2G2D2F
2D2G2"
1410 DATA THIS FISH IS *
1415 DATA DEAD,ALIVE,TASTY,AWFUL
1420 DATA"BR34BD34NU8R6NU8R6NU8B
R6U8R8D4NL8D4BR6NU8R8BR6U8D4R4NE
4F4BR6ND4U12L68D16NR68U18R68U2L6
8U2R68U2L68U2R68U2L68U2R68U2NL68
L28NU6L10NU6BD32ND6BR10ND6"
1425 DATA THIS SIGN TELLS YOU TO
 *
1430 DATA GO,STOP,LISTEN,TALK
1435 DATA"BR34BD34NU8R6NU8R6NU8B
R6U8R8D4NL8D4BR6NU8R8BR6U8D4R4NE
4F4BR6ND4U12L68D16NR68U32R68ND32
L28NU6L10NU6BD32ND6BR10ND6BU20BL
34R2NU8R8U8NL10BR6ND8R8D8NL8BR6U
8F8U8BR6R2ND2BR4R4ND8R4"
1440 DATA THIS SIGN TELLS YOU TO
 *
1445 DATA STOP,GO,LISTEN,TALK
1450 DATA"BR22BD16NR68M+4,+10F16
G6R40H6E16M+4,-10BD10BR6R10F4D6G
10M-10,+3L10E6R10E6U2H2L4U4BU10B
L30G6D4NF4G8"
1455 DATA THIS CUP IS *
1460 DATA BROKEN,FIXED,HEAVY,LIG
HT
1465 DATA"BR22BD16NR68M+4,+10F16
G6R40H6E16M+4,-10R10F4D6G10M-10,
+3L10E6R10E6U2H2L4"
1470 DATA THIS CUP IS *
1475 DATA FIXED,BROKEN,HEAVY,LIG
HT
1480 DATA"BR30BD42R50E4U6M-6,-16
E2U4H4L12G2D6F2R4NE2D10H2L2H2L4H
2L6G2L4G2L2G2L4BU10R12U2L12U2R12
NR16U2NR16L12U2R12U2L12BR60R12D2
L12D2NL16R12D2L12NL16D2R12D2L12"
1485 DATA THIS SHOWS A * ARM
1490 DATA STRONG,WEAK,HEAVY,LIGH
T
1495 DATA"BR30BD42R12D2R10D2R6U2
R10U2R12E4U6M-6,-16E2U4H4L12G2D6
F2R4NE2D12L34BU16NR26NU4ND2U2R26
BR22R22NU2ND4D2L22"
1500 DATA THIS SHOWS A * ARM
1505 DATA WEAK,STRONG,HEAVY,LIGH
T
1510 CLS:PRINT@101,"YOU TRIED"NC
+NW"TIMES &":PRINT@165,"ANSWERED
"NC"CORRECTLY"
1515 PRINT@229,"WHILE DOING"NW"W
RONG."
1520 NQ=NC+NW:IF NQ=0THEN NQ=1
1525 MS=INT(NC/NQ*100)
1530 PRINT@293,"YOUR SCORE IS"MS
"%."
1535 PRINT@357,"ANOTHER TRY (Y/N
/C) ?";
1540 X$=INKEY$:IFX$="Y"THEN RUN
1545 IFX$="N"THENCLS:END
1550 IFX$="C"THEN1560
1555 GOTO1540
1560 IF FF=1 THEN RUN
1565 IFV=1THENSCREEN1,1:GOTO290
1570 IFV=0THENSCREEN1,1:GOTO245
```

Finally, a beginner's project that does something

A Simple, Expandable LED Project

By Tony DiStefano
Rainbow Contributing Editor

Ever notice that my articles run in patterns? Usually, I start with a simple project for the beginner, move on to a harder, longer project and then finish with an electronic lesson. Well, it's time, once again, for a beginner's project. It is always hard to design a simple project that actually does something. As an electronics student in college, I did a lot of labs. They were simple, but they were *boring*. (Set the power supply to 10 volts. Put two resistors in series. Measure the voltage across the two resistors. Compare the values to that of the calculated voltage values.) Those labs were enough to put you to sleep in the middle of a lab.

For this column, I had to design a project that is simple but not boring. I checked to see what beginners wanted as a starter project. Most said they wanted something that worked in front of them — something that buzzed, beeped, moved or lit up. In the past, I have had projects using an LED to indicate that power is on, the disk drive is on, etc. LEDs are always a good project, and this beginner's project makes the computer control up to eight LEDs. (Note: Even though this project is for beginners, some electronics knowledge is required. Read the article and judge for yourself if you understand enough of it to try it.)

I will continue this project for a few months and make it grow into a miniature control center. This project will show the beginner how to turn on LEDs, small motors, relays, sensor devices, etc. If you come up with a few ideas, let me know. You can write to me in care of THE RAINBOW or reach me on Delphi.

As with any project, you need tools. How far you want to go with this project will determine how many tools and parts you will need. To begin the project, you will need the following parts:

Part #	Description
U1	74LS273
C1	.1uf 10 volts
R1 to R8	470 ohm ¼ watt
D1 to D8	LED (just about any kind)
Misc.:	20-pin socket and wire.

You may already have some of these materials, and most are available at your local Radio Shack. You may need to get some parts through a mail order service. Many companies that have the parts advertise in RAINBOW.

The first thing you need is a project board. Radio Shack has dropped this item. I suggest you check RAINBOW's advertisements to find a board. I get my boards through CRC, but the board is available through other companies. At this time, the only tools you will need are a soldering iron and some solder.

It should take less than two hours to assemble this project. We will do it together, step by step. Don't start until you have all the parts. It's no fun to let a project sit, incomplete, because some of the parts are missing.

Before we begin, it is important to

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

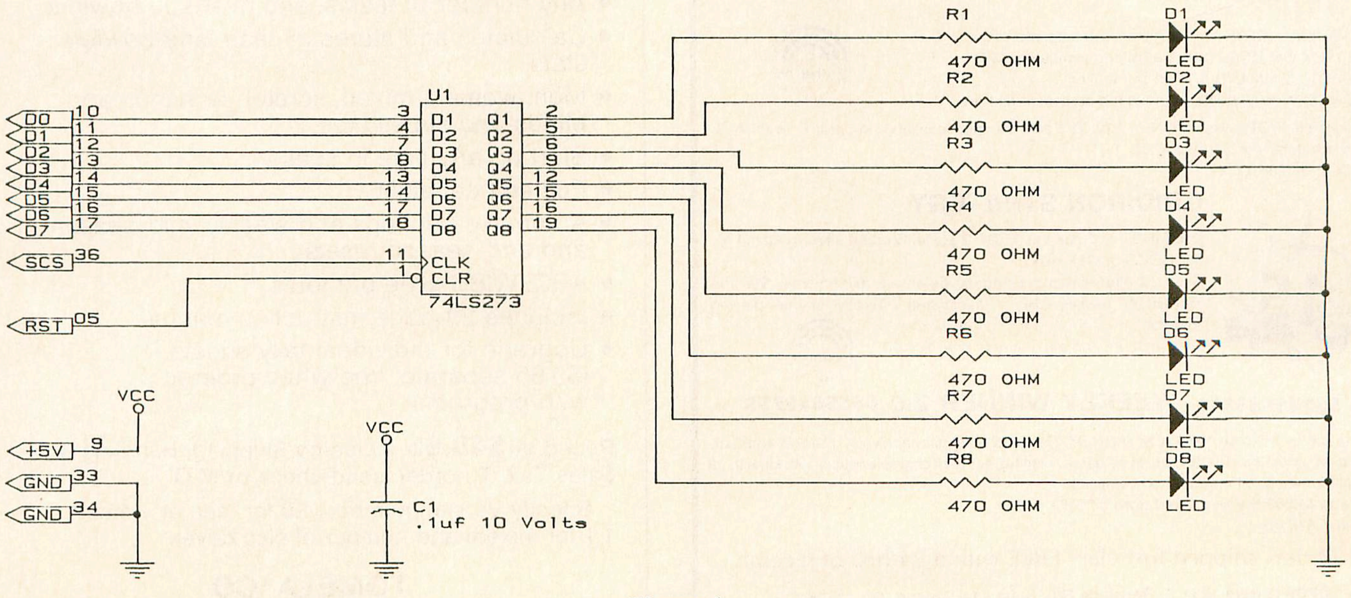

Figure 1

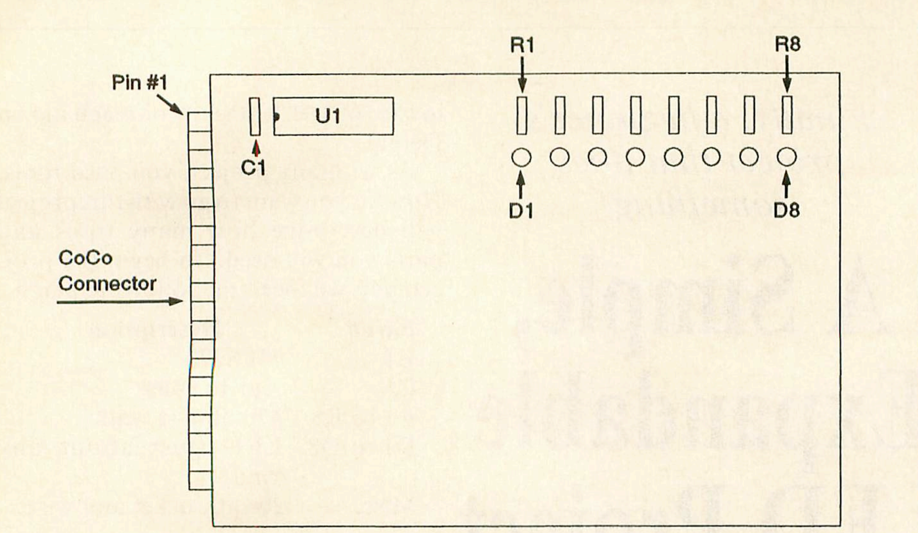

Figure 2

understand how a schematic diagram works. Look at Figure 1, and examine U1. The pin numbers are not drawn in any order. They are arranged so the diagram is easy to understand. All the inputs are one side, and all the outputs are on the other.

On the actual board, the pins are arranged in order. Begin with Pin 1, which is identified by a notch or dimple. The next pin in a counter-clockwise direction is Pin 2. The other pins are in the same counter-clockwise order. The boxes on the left of Figure 1 are the pin descriptions for the CoCo's pin connector. The numbers above the wires are the pin numbers. Pin +5V leads to a box labeled VCC. That means every point in the diagram hooked up to VCC is really hooked up to that pin. This also applies to Box GND. All points marked GND are connected.

While it is not obvious on this small diagram, the way the diagram is presented makes the schematic easier to read. Instead of wires everywhere, labels are used. (Please note: Though not marked on the diagram, U1 has a VCC at Pin 20 and a GND at Pin 10.

Now, let us begin the project.

First, put all the parts on a clean table. If you are using a CRC project board, make sure you have the right side up. A small #1 is printed next to Pin 1. This is the top. Pin 2 is directly below Pin 1. Pin 3 is next to Pin 1, Pin 4 is below Pin 3 and next to Pin 2, etc. All parts will mount on the top.

Mount the 20-pin socket in the top of the protoboard. For proper placement, follow the plan in Figure 2. Make sure that Pin 1 is the pin closest to the edge connectors. Solder all the pins of the socket, and mount the resistors and LEDs. Make sure that the short lead of the LED is positioned away from the resistors. They are polarized, and the short lead is the negative side. Bend the leads so that no part falls out. Insert the capacitor next to the socket, and bend the leads of this part as well.

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The rest is just wiring. You know the pin numbers and positions. One at a time, solder a wire between the points in the schematic. Every time you place a wire, mark it off on the diagram. This serves two purposes: that you don't miss any points and that you don't try to do any point twice.

Let's do the first few together. Following the schematic, solder one end of the wire to Pin 10 on the connector. Cut the wire so that it just reaches Pin 3 of U1, and solder that end of the wire to Pin 3 of U1. Mark off this wire on the schematic. Next, solder an end of the wire to Pin 11 of the connector. Cut the wire so that it just reaches Pin 4 of U1, and solder that end to Pin 4. Mark off that wire on the schematic. Now finish off the rest of the wires one at a time. When you are finished, recheck all your work. Remember to check the VCC and GND of U1. Insert the 74LS273 into the socket, and make sure that Pin #1 is in the right place.

That's all there is to the hardware part of it. Plug it in, turn on your computer and check for the normal power-up message. If you do not, turn off the computer and check your work again.

Now that you have built it, let's see how it works. Look at Figure 1. The main part in this project is U1, an eight-bit D-type flip-flop. All the D's are inputs and all the Q's are outputs. When the CLK input is strobed, the binary level on D is transferred to Q. Thus, if all D's were at Level 1 when the CLK was strobed, all the Q's (outputs) are now at Level 1. The D's are now at Level 0. The CLK that I am using is the CoCo's SCS pin. It is mapped at $FF40 to $FF5F. Since I am not using any address lines, mirroring will occur throughout this area. Next month, when we expand, I'll use the address lines to add more to this project.

Since they are all connected to identical circuits when any Q has 0 volts, no current can flow because the other end of the circuit also has 0 volts (GND). The LED is off. When any Q is high, roughly three to five volts, current flows through the resistor and the LED.

Since each LED is represented by one bit on the CoCo's bus, D0 on the CoCo controls LED 1, D1 controls LED 2, etc. Since it is memory-mapped on the CoCo's bus, a simple BASIC poke command will turn on the LEDs. Thus, if you type `POKE &HFF40, 255`, all the LEDs should go on. (Wow! It works.)

If it doesn't work, check all your wiring. Did you put all the LEDs in the right direction? Try reversing one and see.

If it is working, continue by typing `POKE &HFF40, 1`. Only one LED should be on. Now try typing `2` instead of `1`, then `4`, `8`, `16`, `32`, `64` and finally `128`. Each LED should light up, one at a time. Now try `72` (8 + 64). Adding two LED values together will cause both LEDs to come on. Use a `FOR/NEXT` loop to write a program that makes a chaser.

Those of you with Multi-Pak Interfaces must remember that the SCS pin is switched. In order to poke the values at $FF40 in the right slot, you must change the slot access. You can do this by going into the all-RAM mode and turning the switch in front of the Multi-Pak to the project's slot. You can also make sure that your disk controller is in Slot 4, then put your project in Slot 1 and type `POKE &HFF7F, &H30`. This will change the SCS access to Slot 1 and leave the CTS, or DOS, access in Slot 4. Remember to return to &H33 before trying to access the disk.

In my next column, I'll expand this project to include more goodies that beep, boop and buzz.

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Barden's Buffer

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Sorting It All Out

By William Barden, Jr.
Rainbow Contributing Editor

You wouldn't think sorting would be such a big deal on computers, would you? Alphabetizing a mailing list, arranging shapes in order of size, building an ordered word list — it just doesn't seem like a profound task. And yet, I'm sitting here with Knuth's *Sorting and Searching*, a 700-page book with fine print that discusses the various sorting methods. Although Knuth is a renowned computer expert, he doesn't write for the popular audience. (In fact, I haven't seen *many* descriptions of sorts that even an experienced programmer would understand.)

This column will attempt to describe four typical sorts so that average RAINBOW readers (*and* the author) can understand them. Fortunately, we can use CoCo graphics to our advantage in this situation. The programs I'm about to describe not only *sort* data, but they *display* the data on the CoCo screen as it is sorted. I was amazed to see just how easily the sorts can be visualized if you can, well, *visualize* them.

A Row of 126 Sticks

Suppose that you have a row of 126 sticks of various sizes; some of the sticks may be the same size. How do you sort them? One way is to bundle them up, stand them on a flat surface, and pick the longest stick. This stick is then set aside, and the process is repeated for the next stick, and the next, etc. The process continues for all 126 sticks — 126 selections are made.

A computer sort can proceed the same way. However, the computer can't *see* all 126 sticks and pick out the longest. It must scan through all 126 sticks, and compare each new stick with one previously set aside as the longest. It's as if a friend were holding the sticks behind his back and handing them to you one at a time. You'd compare the new stick with the longest stick you had found so far, and save the new stick if it was longer.

A Selection Sort

The Selection Sort is similar to the case of the friend holding sticks behind his back. At the end of one pass through the sticks, the Selection Sort selects the longest stick. Let's see how it works.

Suppose that you have the 10 sticks shown *in Figure 1* and want to place them in order, smallest to largest, left to right. First, assume that we have a pad and pencil on which we've noted the "largest stick" and its position — one through 10. We'll begin with an imaginary stick *smaller* than any in the pile and place it in Position -1. We will also note on the pad the last position of the row — Position 10. Moving from left to right, we will look at each new stick. If it's larger than the largest stick we've recorded, we make a note of its position. As we continue moving to the right, we compare each stick to the largest stick we have found. If a new stick is larger, *it* becomes the largest stick, and its position is noted on the pad. At the end of one pass, we have the position of the largest stick. We now exchange that stick with the stick in the last position. Position 10 now holds the largest stick.

Next, we use Position 9 as the last position and start the process again — examining the sticks in positions one through nine. At the end of this scan we have the position of the next largest stick, and we exchange this stick with the one in Position 9. Then we begin the process again, using Position 8 as the last position. Next we use Position 7, etc. Each time we complete the process, we add the next largest stick to the last position. It takes 10 passes to order the sticks from largest to smallest, left to right.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

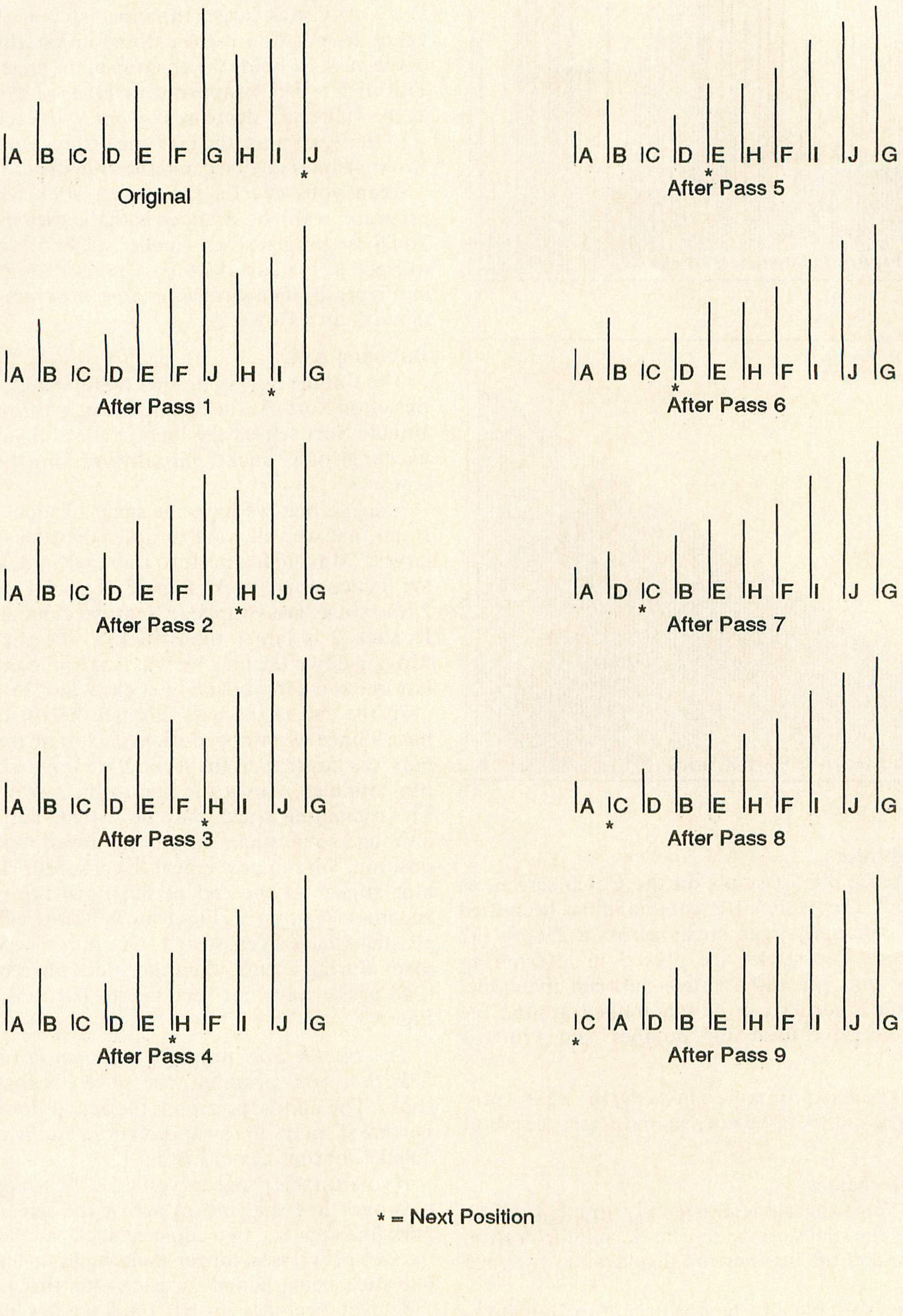
A B C D E F G H I J
*
Original
A B C D E F J H I G
*
After Pass 1
A B C D E F I H J G
*
After Pass 2
A B C D E F H I J G
*
After Pass 3
A B C D E H F I J G
*
After Pass 4
A B C D E H F I J G
*
After Pass 5
A B C D E H F I J G
*
After Pass 6
A D C B E H F I J G
*
After Pass 7
A C D B E H F I J G
*
After Pass 8
C A D B E H F I J G
*
After Pass 9
* = Next Position

Figure 1: Selection Sort

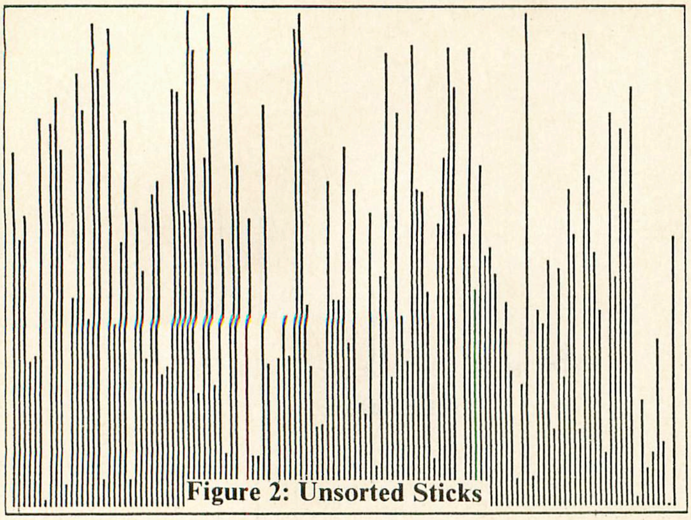

Figure 2: Unsorted Sticks

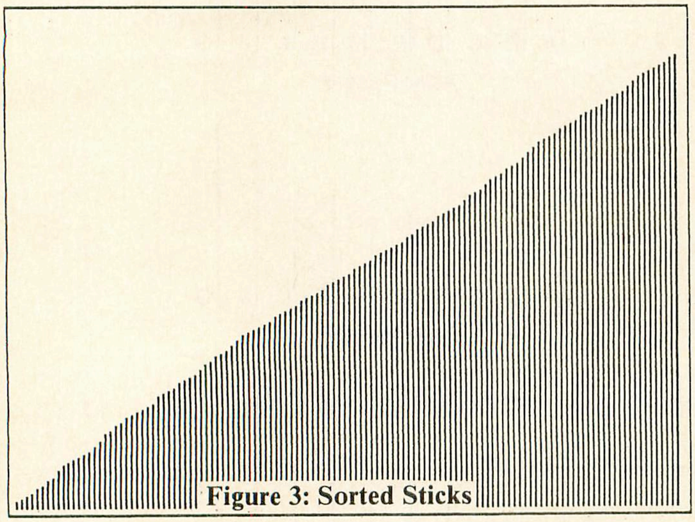

Figure 3: Sorted Sticks

A Screen Full of Sticks

We've simulated a pile of sticks on the CoCo screen, as shown in Figure 2. The BASIC `LINE` command has been used to generate 126 randomly-sized sticks across a 256-by-192 resolution screen. The sticks are placed in alternating columns so that you can differentiate between individual sticks and so that a border can be maintained around the screen. (We could have used any number, but 126 was convenient.)

The lengths of the sticks are stored in Array `NO`, a 126-entry numeric array. The values in `NO` correspond to the length of each stick.

Selection Sort Mechanics

The *Selection Sort* program is shown in Listing 1. The first portion generates the sticks on the screen; the middle portion is the actual sort; and the last portion displays the swapped sticks.

In the program, Variable `J` is the position of the last stick. It begins as Position 126 and ends as Position 1. Imagine this position changing as smaller and smaller sticks move from the rightmost to the leftmost position. As the pass progresses, Variable `LS`, will hold the value of the largest stick. The initial value of `LS` is -1. Because every stick is larger than this, it's guaranteed that there will be a new largest stick at the end of the first pass. Variable `SI` records the current position of the largest stick. Its initial value is also -1, an illegal value, but this will be changed to a legitimate value by the end of the first pass.

The main loop in the sort is Line 220. The stick lengths from `NO(1)` through `NO(J)` are compared to the largest stick in `LS`. Any stick larger than the value in `LS` replaces the `LS` value. Its position is then stored in Variable `SI`. At the end of the pass, `SI` holds the position of the largest stick — `NO(I)`. This stick is then swapped with `NO(J)`. The process continues as the value of `J` decreases by one with each pass.

(After each pass, the two line display subroutines clear the two stick lines involved and then rewrite the exchanged lines.)

Keep your eye on the largest stick while running this program. It will be swapped with the stick in the last position. You'll see progressively smaller sticks being placed from left to right as the sort is done. The result of this sort is shown in Figure 3. The *Selection Sort* program takes about 1½ minutes on a CoCo 2.

Bubbling Away

The Bubble Sort is another popular sort. It's similar to the Selection Sort. At the end of one pass through the sticks, the Bubble Sort selects the longest stick. However, it may also exchange other sticks, partially ordering them. Let's see how it works.

Imagine that we have the same 10 sticks shown in Figure 1 and that we still want to order the sticks from smallest to largest. Moving from left to right, we look at a pair of sticks. We first compare sticks 1 and 2. If Stick 1 is larger than Stick 2, the sticks are swapped. Next we compare sticks 2 and 3. If Stick 2 is larger than Stick 3, the sticks are swapped. Moving down the line, we will make nine comparisons — the last one is a comparison of sticks 9 and 10.

At the end of the pass through the 10 sticks, what do we have? Since we swapped sticks each time the first stick in the pair was larger than the second, we find that the largest stick has "bubbled" down the line to the last position, Stick 10. The remaining sticks may be sorted, but probably aren't, although some sticks have been moved toward their correct position. We can now repeat the procedure for the remaining nine sticks. At the end of this pass, the next largest stick occupies Position 9. Eight more passes will guarantee that all sticks have been sorted. Of course, when no swaps are made during a pass, then the sticks have been sorted, even if 10 passes have not been made. The first pass is shown in Figure 4.

The *Bubble Sort* program is shown in Listing 2. Like the *Selection Sort* program, the screen is first filled with 126 sticks. The middle portion is the actual Bubble Sort. The last portion displays the swapped sticks and is similar to the line display subroutines in Listing 1.

If you run this program you'll see the swapping taking place as a dark line that moves across the screen. Each time the dark line appears, two adjacent sticks are being swapped. As the sort progresses, longer sticks build up on the screen right, one stick being added for each pass through the sticks. As the screen becomes sorted, you'll see fewer and fewer swaps being made.

The sort portion of the program uses two variables. Variable `J` always points to the last entry in the list. `J` starts at 126, the last screen line, but decreases by one for each pass. Variable `I` is the current location of the stick as a pass is made from Stick 1 to Stick `J`. Swaps are made by swapping stick

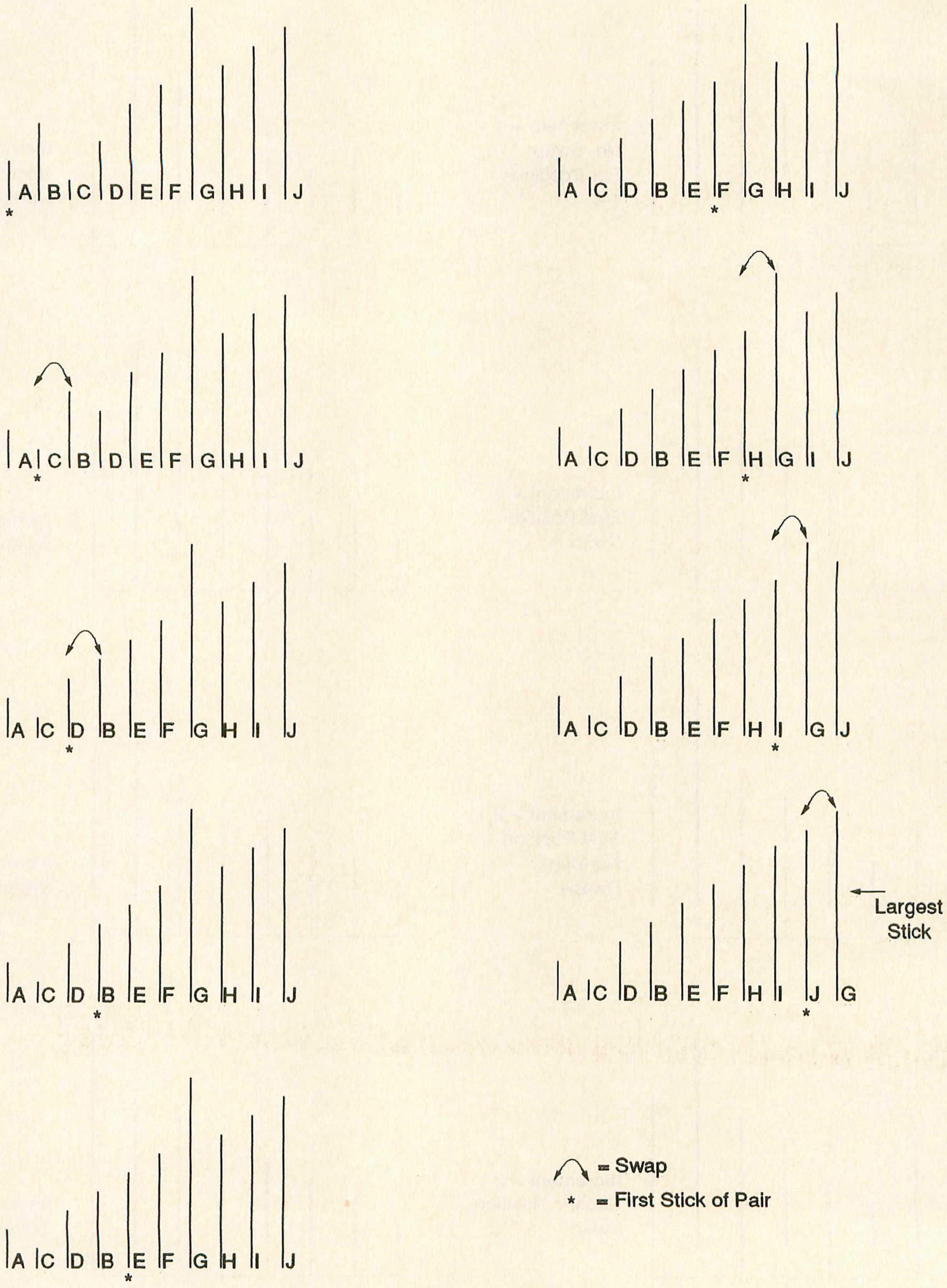
A B C D E F G H I J
*
A C B D E F G H I J
*
A C D B E F G H I J
*
A C D B E F G H I J
*
A C D B E F G H I J
*
A C D B E F G H I J
*
A C D B E F H G I J
*
A C D B E F H I G J
*
A C D B E F H I J G
*
Largest Stick
= Swap
* = First Stick of Pair

Figure 4: One Pass of a Bubble Sort

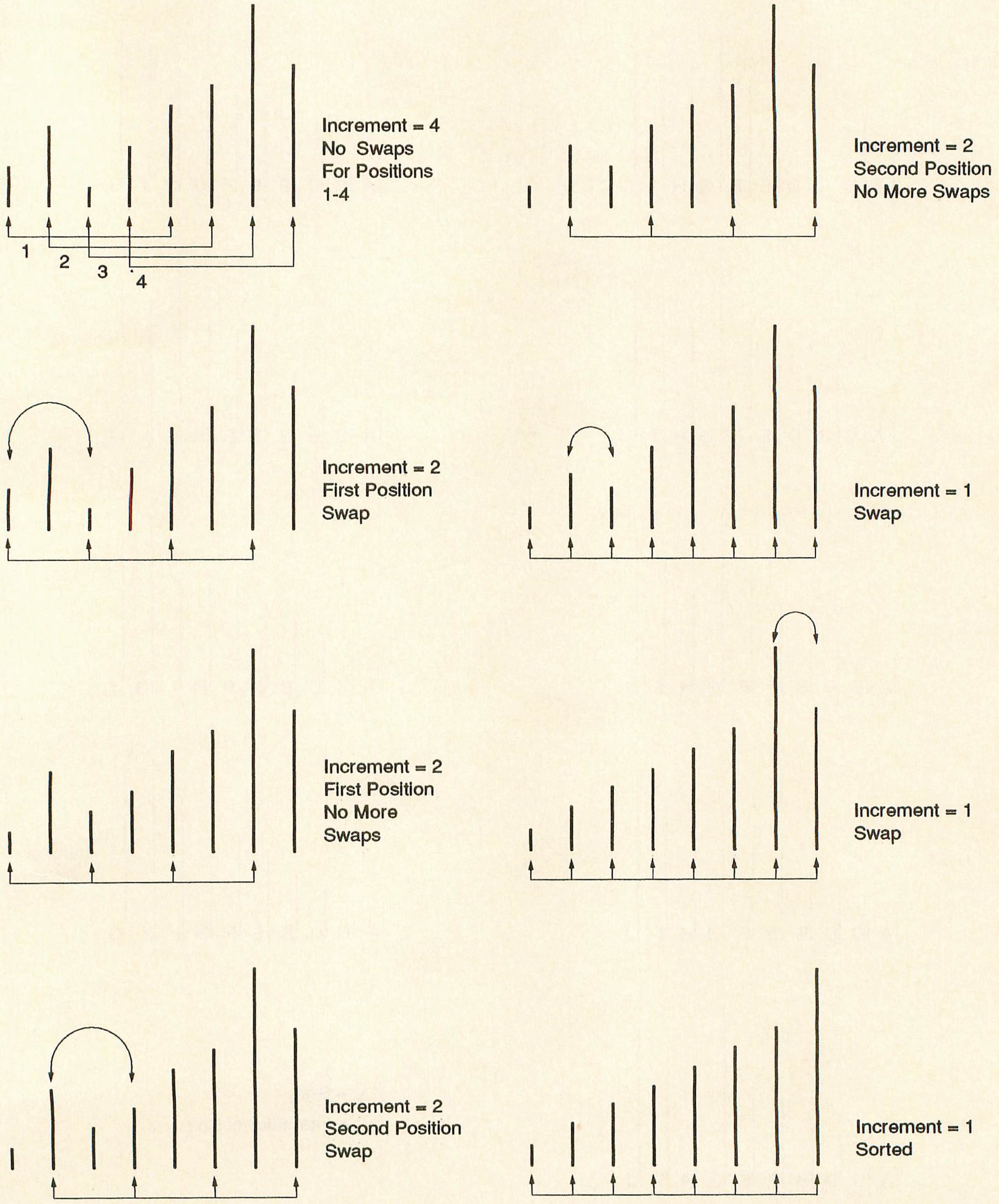
Increment = 4
No Swaps
For Positions
1-4
1
2
3
4
Increment = 2
Second Position
No More Swaps
Increment = 2
First Position
Swap
Increment = 1
Swap
Increment = 2
First Position
No More
Swaps
Increment = 1
Swap
Increment = 2
Second Position
Swap
Increment = 1
Sorted

Figure 5: Shell Sort of Eight Sticks

`NO(I)` and `NO(I + 1)`. A swap flag, held in `SW`, is set to 1 if a swap occurred. The sort ends when `SW = 0` after a pass (no swap occurred) or `J` reaches 1.

Although the logic for the Bubble Sort is easy, it has one big disadvantage — it's slow for unsorted data. The sort in Listing 2 takes about 3 minutes to sort a screen of 126 sticks (values) when random stick lengths are used and screen graphics are not updated. When screen graphics are updated, the sort takes about 16 minutes. On the other hand, the sort is almost instantaneous when the data *is* sorted and very fast when only a few values are out of order. By comparison, the Selection Sort would slog through all 126 passes!

The Shell Game

Why is the Bubble Sort so slow? Although you can think about it abstractly, it's obvious from the screen — it takes many passes to move a stick that's out of order across a whole screen, and there are many sticks to be moved. It would be nice to bypass the tedious swapping and just throw the sticks in about the right location based upon length. You could then do a more detailed sort after the sticks were approximately arranged in order. This is the idea behind the *Shell Sort* program, shown in Listing 3.

The first part of the *Shell Sort* program generates the same type of random data as in the two preceding sorts — 126 sticks with values in array `NO()`. The line display subroutines are at the end, as in the previous program. The actual shell sort is in the middle of the program.

The Shell Sort is more complicated than the Bubble Sort but is about five times faster — the program taking about three minutes instead of 16. This sort is *much* faster than the Selection Sort when the screen data is not updated (*Selection Sort* only re-draws 126 pairs of lines, but *Bubble Sort* and *Shell Sort* re-draw the lines constantly). A sort utility would not waste time displaying the sort data as we are doing.

The operation of the Shell Sort is obvious from the screen. The program uses an *increment* that spans the width of sticks. The increment begins at half of 126 — 63. Using this increment, sticks 1 and 64 are compared, and swapped if they are out of order. Next, sticks 2 and 65 are compared and swapped if out of order. This process continues until sticks 63 and 126 are compared. The pass is like the Bubble Sort — but with gaps. At the end of the first pass, many sticks have been moved approximately to the proper position. If any swaps occurred, the same increment — 63 — is used again. The increment of 63 is maintained until no swaps occur.

Next, the increment is divided approximately in half, to 31 (fractional values are not meaningful here, so a BASIC `INT` function is used to find the next lower integer value for the increment). Now the width of sticks are scanned again — a Bubble Sort of four items (i.e., Stick 1 is compared to Stick 32, Stick 32 to 63, Stick 63 to 94 and Stick 94 to 125). At the end of this pass, the smallest stick has been moved to Position 125. The increment of 31 is maintained until no swaps occur.

Now increments of 15, 7, 3 and 1 are used to further sort the data. The increment of 1 is really a Bubble Sort, but at this point most of the sticks have been positioned near their proper positions and the sort is much faster. The sort is over when the increment has been reduced to 0.

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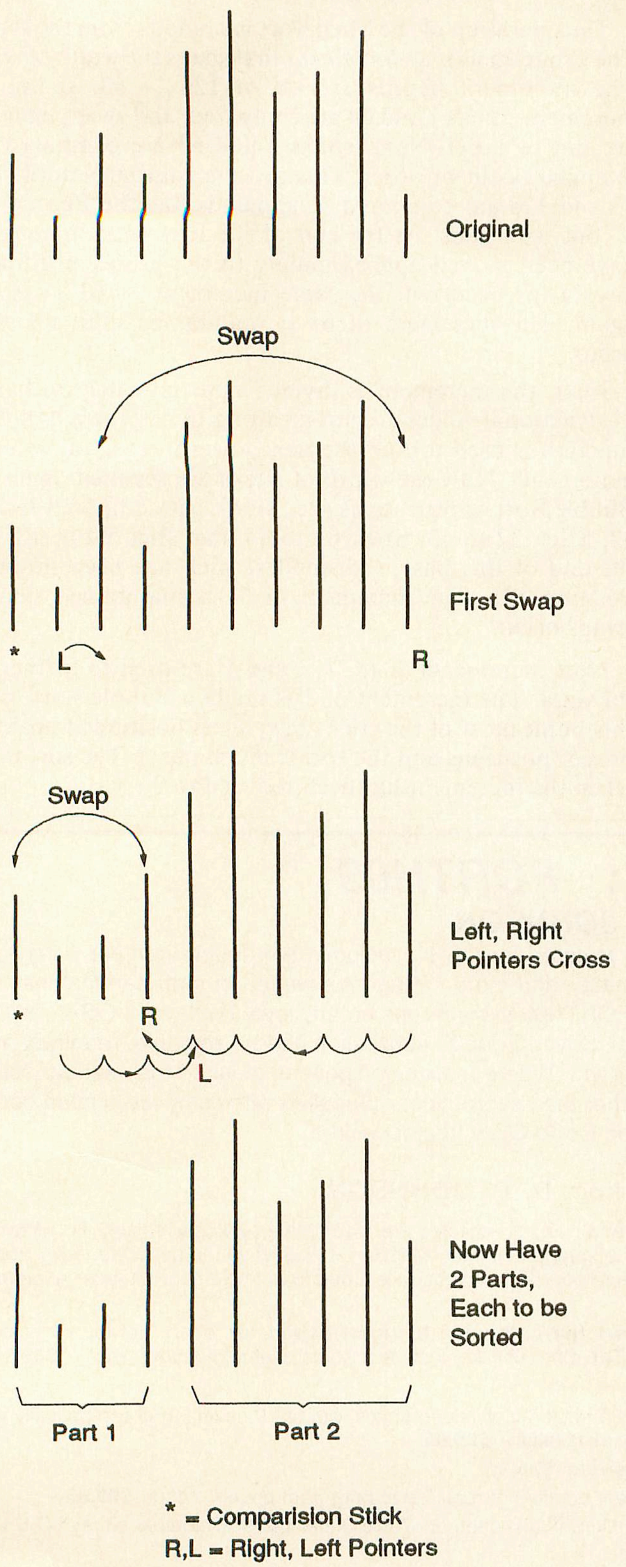

Original
Swap
First Swap
*
L
R
Swap
Left, Right Pointers Cross
*
R
L
Now Have 2 Parts, Each to be Sorted
Part 1
Part 2
* = Comparision Stick
R,L = Right, Left Pointers

***Figure 6:* Sample Quick Sort Pass**

The process is shown for an eight-stick row in Figure 5.

In the program, Variable `IN` is the increment, `ST` is the starting location, `EN` is the ending location and `I` is the current location within the range.

A Quicker Sort

The quickest sort of all for random data (when screen graphics are not considered) is the Quick Sort. It's more complicated than the Shell Sort, but it sorts screen data in about 45 seconds when graphics are not used and 90 seconds when graphics are used.

> ***"I've seen the Acropolis by moonlight and Los Angeles through the haze, but I'll have to say that the* Quick Sort *display is really* beautiful *to watch — not so much in an aesthetic sense, but beautiful in a logical sense."***

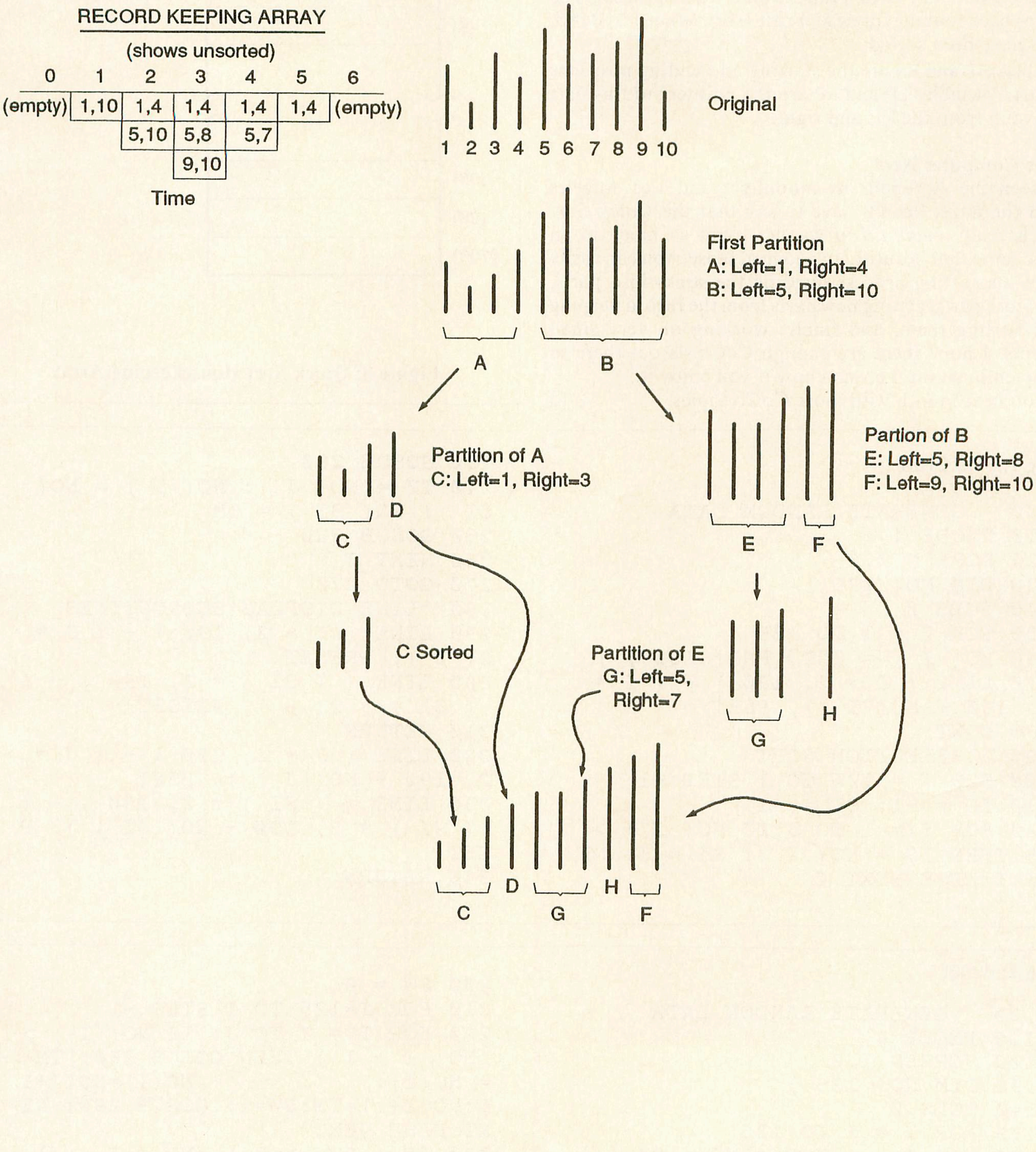
The Quick Sort works like this: Start with a row of 10 sticks again. Now choose the first stick in the row and note its length. The row is now divided into two parts — left and right. Sticks in the left part are of lesser or equal length to the comparison stick and sticks in the right part are of greater length. The sticks are ordered by moving down the row in both directions at the same time. The sort keeps moving from the right until the first stick shorter than the comparison stick is found, and keeps moving from the left until the first stick longer than the comparison stick is found. Those two sticks are swapped, and the sort continues until the comparison has reached the middle of the sort. The comparison stick is then swapped with the last entry of the left portion. A sample pass is shown in Figure 6.

Any stick in the left part is definitely smaller than any stick in the right part. However, within each part, the sticks probably aren't ordered. Now each part is considered separately. The whole process repeats again for the left part. The first stick is used as a comparison stick and the left part is further subdivided into two parts — the left part holding all sticks smaller than the comparison stick, and the right part holding all sticks larger than the comparison stick. The same process is repeated for the right part.

This division into parts continues until each part holds two units. In a 126-stick set, for example, there will be about 63 parts. The beauty of the sort is that sticks are moved over great distances and put into rough order without a lot of overhead.

The main problem with a Quick Sort is that a record must be kept of each part — the position number of the start and the position number of the end. This record keeping calls for a list or array of items. After each sort of a part, the list is used to find unsorted parts, which will then go through the process and generate new parts. A sample of a Quick Sort of a 10-item list — including a record keeping list — is shown in Figure 7.

The *Quick Sort* program is shown in Listing 4. The


Original
1 2 3 4 5 6 7 8 9 10
First Partition
A: Left=1, Right=4
B: Left=5, Right=10
A
B
Partition of A
C: Left=1, Right=3
C
D
Partion of B
E: Left=5, Right=8
F: Left=9, Right=10
E
F
C Sorted
Partition of E
G: Left=5,
Right=7
G
H
C
D
G
H
F

RECORD KEEPING ARRAY

(shows unsorted)

0	1	2	3	4	5	6
(empty)	1,10	1,4	1,4	1,4	1,4	(empty)
		5,10	5,8	5,7		
			9,10			

Time

Figure 7: Quick Sort of a 10-Stick Row

generate data code is identical, and the line display subroutines are similar, to the other sorts. The actual sort code uses a housekeeping array, `LS`. The first value of the array — `LS(0)` — is a pointer to the next available location in the array (see Figure 8). Two values at a time are put into the array — the left- and right-most stick positions. There may be many different sets of these, defining both large and small parts. As parts are sorted, two new parts are created, and the end points of each of these are put into the `LS` array. End points are taken out two at a time to start a sort process. The sort loops back looking for new parts to sort. When `LS(0)=0`, all parts have been sorted.

Variables `ST` and `EN` are the starting and ending positions for a part. Variables `LP` and `RP` are the pointers to this part and move in from the left and right.

Another Computer Nerd

I've seen the Acropolis by moonlight and Los Angeles through the haze, but I'll have to say that the *Quick Sort* display is really *beautiful* to watch — not so much in an aesthetic sense, but beautiful in a logical sense. You can easily visualize the sorting process dividing the sticks into parts, sorting those parts, getting new parts from the record keeping list and sorting them, and finally working on very small increments. I hope there are enough CoCoists out there to share my enthusiasm. Let me know if you enjoy it.

See you next month with more CoCo topics. □

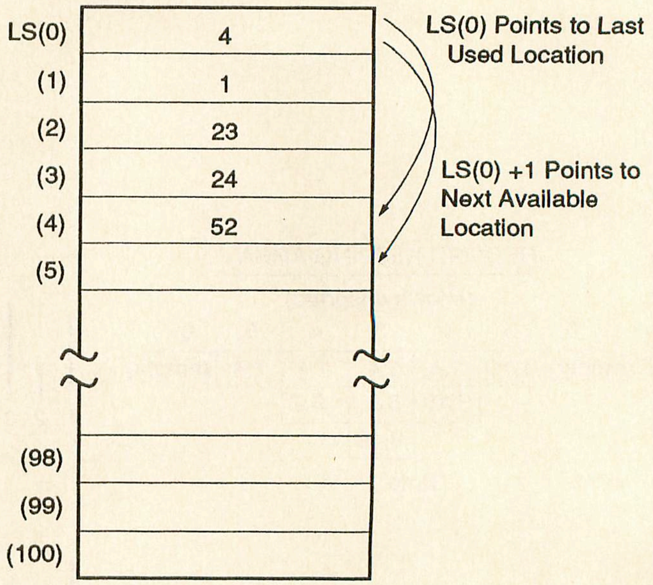

LS(0)
4
(1)
1
(2)
23
(3)
24
(4)
52
(5)
(98)
(99)
(100)
LS(0) Points to Last Used Location
LS(0) +1 Points to Next Available Location

Figure 8: Quick Sort Housekeeping Array

Listing 1: `SELECTON`

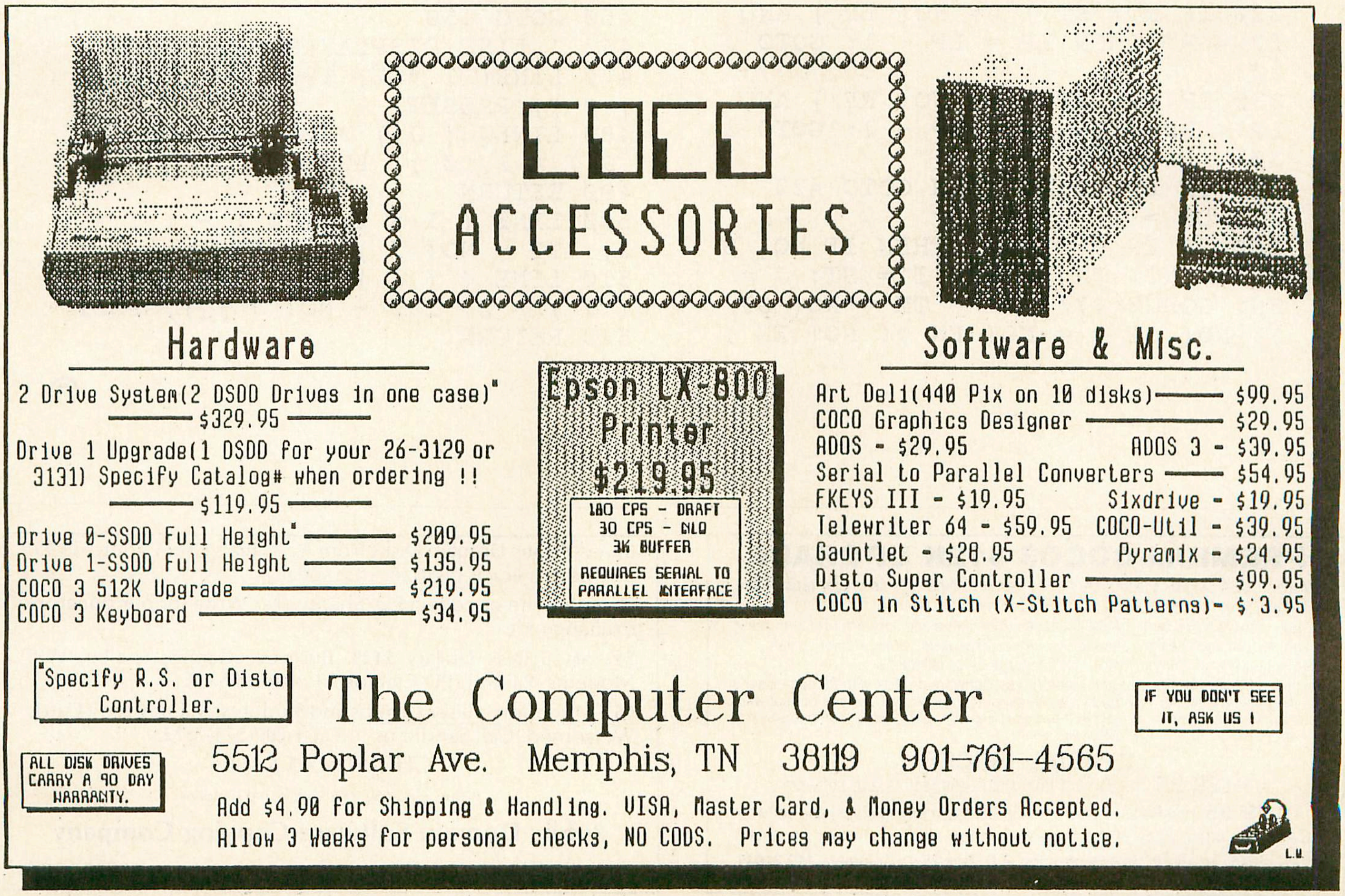
```
   100 ' GENERATE RANDOM DATA
   110 PMODE 4
   120 SCREEN 1,0
   130 DIM NO( 126 )
   140 PCLS 0
   150 FOR I = 1 TO 126
   160 NO( I ) = INT( RND( 190 ) )
   170 LINE ( I * 2, 190 ) - ( I *
   2, 190 - NO( I )), PSET
   180 NEXT
   190 ' SELECTION SORT
   200 FOR J = 126 TO 1 STEP -1
   210 LS = -1: SI = -1
   220 FOR I = 1 TO J:IF NO( I ) >
   LS THEN LS = NO( I ): SI = I: NE
   XT I ELSE NEXT I
230 GOSUB 290
240 TM = NO( J ): NO( J ) = NO(
SI ): NO( SI ) = TM
250 GOSUB 320
260 NEXT J
270 GOTO 270
280 'LINE DISPLAY SUBROUTINES
290 LINE ( J * 2, 190 ) - ( J *
2, 0 ), PRESET
300 LINE ( ( SI ) * 2, 190 ) - (
 ( SI ) * 2, 0 ), PRESET
310 RETURN
320 LINE ( J * 2, 190 ) - ( J *
2, 190 - NO( J ) ), PSET
330 LINE ( ( SI ) * 2, 190 ) - (
 ( SI ) * 2, 190 - NO( SI ) ), P
SET
340 RETURN
```

Listing 2: `BUBBLE`

```
    100 ' GENERATE RANDOM DATA
    110 PMODE 4
    120 SCREEN 1,0
    130 DIM NO( 126 )
    140 PCLS 0
    150 FOR I = 1 TO 126
    160 NO( I ) = INT( RND( 190 ) )
    170 LINE ( I * 2, 190 ) - ( I *
    2, 190 - NO( I )), PSET
    180 NEXT
    190 ' IMPROVED BUBBLE SORT
200 SW = 0
210 FOR J=125 TO 1 STEP -1
220 FOR I = 1 TO J: IF NO( I ) >
 NO( I + 1 ) THEN GOSUB 260: TM
= NO(I):         NO(I)=NO(I+1
):NO(I+1)=TM:SW=1: GOSUB 290: NE
XT ELSE NEXT
230 IF ( SW <> 0 ) AND ( J <> 1
) THEN SW = 0: NEXT J
240 GOTO 240
250 ' LINE DISPLAY SUBROUTINES
260 LINE ( I * 2, 190 ) - ( I *
2, 0 ), PRESET
270 LINE ( ( I + 1 ) * 2, 190 )
- ( ( I + 1 ) * 2, 0 ), PRESET
280 RETURN
290 LINE ( I * 2, 190 ) - ( I *
2, 190 - NO( I ) ), PSET
300 LINE ( ( I + 1 ) * 2, 190 )
- ( ( I + 1 ) * 2, 190 - NO( I +
 1 ) ), PSET
310 RETURN
```

Listing 3: SHELL

```
100 ' GENERATE RANDOM DATA
110 PMODE 4
120 SCREEN 1,0
130 DIM NO( 126 )
140 PCLS 0
150 FOR I = 1 TO 126
160 NO( I ) = INT( RND( 190 ) )
170 LINE ( I * 2, 190 ) - ( I *
2, NO( I )), PSET
180 NEXT
190 ' SHELL SORT
200 IN = 126
210 IN = INT( IN / 2 )
220 IF IN = 0 THEN GOTO 370
230 ST = 1
240 IF ST > IN THEN GOTO 210
250 SW = 1
260 IF SW = 0 THEN GOTO 350
270 SW = 0
280 I = ST
290 EN = ST + IN
300 IF EN > 126 THEN GOTO 260
310 IF NO( EN ) > NO( I ) THEN G
OSUB 390:TM = NO( I ): NO( I ) =
 NO ( EN ): NO( EN ) = TM: SW =
1: GOSUB 420
320 I = EN
330 EN = EN + IN
340 GOTO 300
350 ST = ST + 1
360 GOTO 240
370 GOTO 370
380 ' LINE DISPLAY SUBROUTINES
390 LINE( I * 2, 190 ) - ( I * 2
, 0 ), PRESET
400 LINE( ( EN ) * 2, 190 ) - (
( EN ) * 2, 0 ), PRESET
410 RETURN
420 LINE ( I * 2, 190 ) - ( I *
2, NO( I ) ),PSET
430 LINE ( ( EN ) * 2, 190 ) - (
 ( EN ) * 2, NO( EN ) ), PSET
440 RETURN
```



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Listing 4: QUIKSORT

```
100 ' GENERATE RANDOM DATA
110 PMODE 4
120 SCREEN 1,0
130 DIM NO( 126 ), LS( 100 )
140 PCLS 0
150 FOR I = 1 TO 126
160 NO( I ) = INT( RND( 190 ) )
170 LINE ( I * 2, 190 ) - ( I *
2, 190 -NO( I )), PSET
180 NEXT
190 ' QUICKSORT
200 LS( 0 ) = 0
210 LS( LS( 0 ) + 1 ) = 1
220 LS( LS( 0 ) + 2 ) = 126
230 LS( 0 ) = LS( 0 ) + 2
240 IF LS( 0 ) = 0 THEN GOTO 450
250 EN = LS( LS( 0 ) )
260 ST = LS( LS( 0 ) - 1 )
270 LS( 0 ) = LS( 0 ) -2
280 LP = ST + 1
290 RP = EN
300 DN = 0
310 IF DN = 1 THEN GOTO 240
320 IF NO( ST ) >= NO( LP ) AND
LP < RP THEN LP = LP + 1: GOTO 3
20
330 IF NO( ST ) <= NO( RP ) AND
LP < RP THEN RP = RP - 1: GOTO 3
30
340 IF LP <> RP THEN GOTO 420
350 DN = 1
360 IF EN - ST = 1 THEN IF NO( S
T ) > NO( EN ) THEN I = ST: J =
EN: GOSUB 470:        TM = NO( ST
): NO( ST ) = NO( EN ): NO( EN )
= TM: GOSUB 500: GOTO 310
370 IF EN = RP AND NO( ST ) > NO
( EN ) THEN I = ST: J = EN: GOSU
B 470: TM =          NO( ST ):NO(
 ST ) = NO( EN ):NO( EN ) = TM:L
S( LS( 0 ) +1 )=ST:LS( LS( 0 ) +
   2 ) = EN: LS( 0 ) = LS( 0 )
+ 2: GOSUB 500: GOTO 310
380 I = ST: J = LP - 1: GOSUB 47
0: TM = NO( ST ): NO( ST ) = NO(
 LP - 1 ) :          NO( LP - 1 )
 = TM: GOSUB 500
390 IF LP - ST > 2 THEN LS( LS(
0 ) + 1  ) = ST: LS( LS( 0 ) + 2
 ) = LP - 1:         LS( 0 ) = LS
( 0 ) + 2
400 IF EN - RP > 0 THEN LS( LS(
0 ) + 1 ) = LP: LS( LS( 0 ) + 2
) = EN: LS( 0 )=      LS( 0 ) + 2
410 GOTO 310
420 I = LP: J = RP: GOSUB 470: T
M = NO( LP ): NO( LP ) = NO( RP
): NO( RP )=TM:       GOSUB 500
430 GOTO 310
440 GOTO 240
450 GOTO 450
460 ' LINE DISPLAY SUBROUTINES
470 LINE( I * 2, 190 ) - ( I * 2
, 0 ), PRESET
480 LINE( ( J ) * 2, 190 ) - ( (
 J ) * 2, 0 ), PRESET
490 RETURN
500 LINE ( I * 2, 190 ) - ( I *
2, 190 - NO( I ) ),PSET
510 LINE ( ( J ) * 2, 190 ) - (
( J ) * 2, 190 - NO( J ) ), PSET
520 RETURN
```

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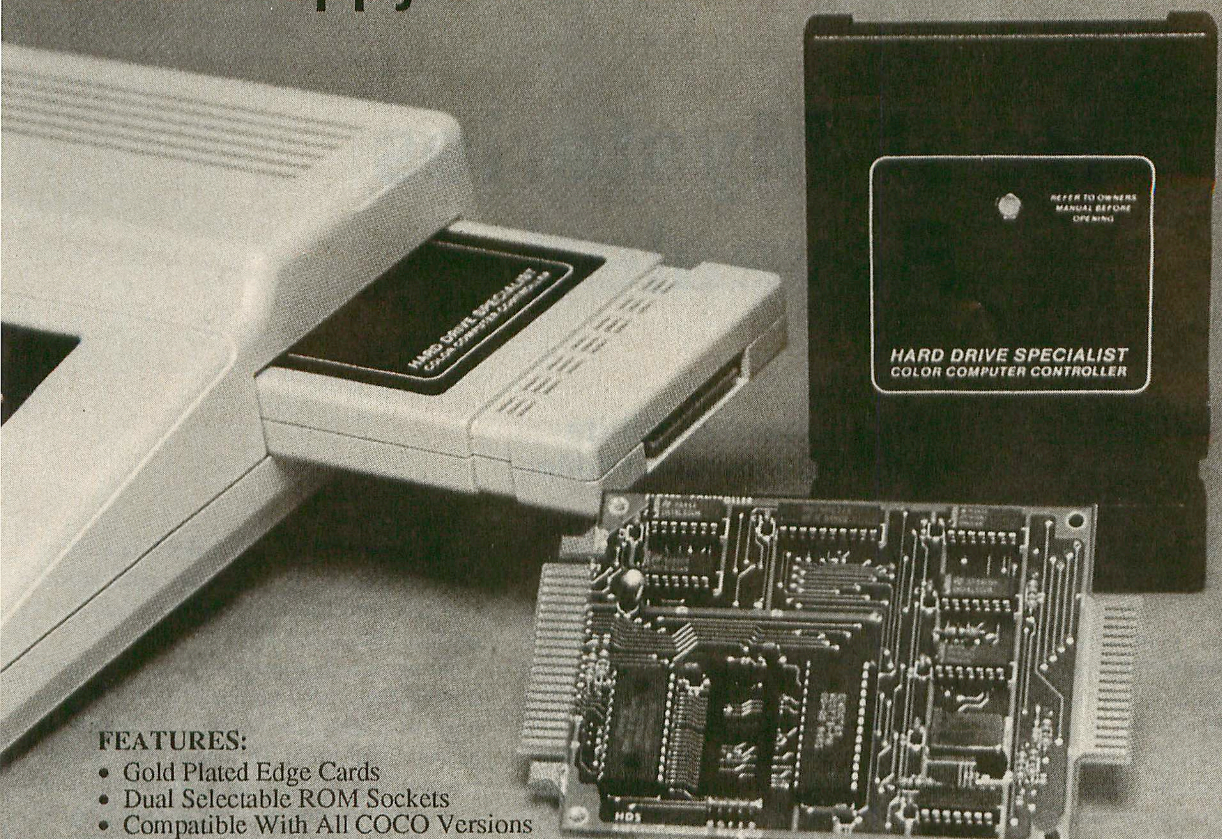
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Boot Mysteries Revealed

By Richard A. White
Rainbow Contributing Editor

I have talked about the OS-9 players — the program modules that manage the computer's operation and the specific data files (generally called descriptors) that provide the operating system with the information it needs to work. I have also mentioned that OS-9 can be configured to match your exact system hardware. System configuration is determined by the modules loaded at OS-9's start-up. These modules are included in the Kernel, located on Track

One of the Kernel's functions is to initialize the system and then load `OS9Boot`. Since the CoCo 3 is different from the CoCo 1 and 2, one would expect the Kernels for the machines to be different. This is partly true. The OS-9 Disk Operating System (Radio Shack, Cat. No. 26-3030) is Level I, Version 1 for CoCo 1 and 2s and will not work on CoCo 3s without modification. A Level I, Version 2 upgrade (special order, Cat. No. 700-2331, $24.95) works on the CoCo 3, but it cannot take advantage of more than 64K of memory or support CoCo 3 graphics. Level II, on the other hand, uses up to 512K of RAM in a CoCo 3 and uses all its graphics features. Level II will only work in a CoCo 3, and it is rather limited in a 128K machine. However, it really shines in a 512K machine.

As you might expect, the Level II Kernel is quite different from the Level I versions. There are changes to other operating system modules as well. The modules to handle the keyboard and screen are new. The disk drive manager, `CC3Disk`, is also new and now handles any double density drive (single- or double-sided, 35-, 40- or 80-track) you want to connect to your system. Consistent with OS-9's design philosophy, which keeps modules transportable between versions whenever possible, most of the other modules are the same as in Level I.

So the first configuration choice you must make is between Level I and Level II. (It's not much of a choice. Level I on a CoCo 3 is a waste of capability.) This is also the only choice that you can buy from Radio Shack. You must use OS-9's utilities to install all other options yourself. OS-9 Level I and Level II both come on single-sided, 35-track disks. Most users can put the System Disk into Drive 0, type `DOS` and let the computer boot into OS-9. A few users with older drive controllers will have trouble.

Disk Extended Basic Version 1.0 does not support the `DOS` command. A short program is provided in the documentation of Radio Shack's OS-9 package that creates a machine language loader. A more costly problem occurs with old, long black controllers sold from 1982 to 1984. Most of these cannot reliably handle the 1.8 MHz CoCo 3 clock speed. This problem is particularly nasty because the controller will *almost* work reliably. But almost isn't good enough, and the only safe solution is to replace the controller.

Next, let us consider what happens during the boot. Generally, this information is not discussed, or it is placed under "technical information" where few will bother to read it. It *is* technical information, but making a new boot is a technical operation — particularly under Level II. The more knowledge you have about the operation, the less confusion you will encounter. I have wandered through my share of OS-9 fog, and I speak with authority. Don't let this scare you. I survived and so will you. After all, if you learned to walk and talk, you can learn to make a boot file.

The `DOS` command under Disk BASIC causes the code on Track 34 to be loaded and executed. (Since track numbering begins with zero, Track 34 is the 35th track.) Under Level I, this code consists of two modules: `OS9` and `OS9p1`. The Level II code includes three modules: `REL`, `Boot` and `Os9p1`. In both cases, these modules initialize the machine, complete the boot operation, link to all the other system modules as they are loaded, and provide basic system services (i.e., memory management and multitasking).

Merging Files

Completing the booting process includes loading the `OS9Boot` file. This file merges all the system modules to be used. Merging files is a particularly useful tool under OS-9 — especially

---

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under Level II. Understanding the operation can be quite useful, so make the effort to learn the process.

A normal OS-9 file starts at the beginning of a sector (256 bytes) of a disk. The file's end will use part of another sector, the remainder of which is wasted. When a number of files are merged into a single new file, each merging file follows immediately after the preceding file. No space is lost. A directory will list the new file, but not the names of the files it contains. Because these merged files still maintain their individual identities, the `Ident` utility will show the header information for each file contained in the new one. With your system disk in `/d0`, type `ident /d0/OS9boot`, and you will see what I mean.

When you load a file into memory, OS-9 starts that file at the beginning of a 256-byte page under Level I or at the start of an 8K block under Level II. Therefore, if you load three 1K files individually under Level II, you will use 24K of memory. Memory is too dear for this kind of waste.

A merged file starts loading into memory like any other file — at the beginning of a page or block. However, the files it contains are loaded immediately following each other in memory. Page and block boundaries are disregarded. Considerable memory is saved — especially with device descriptors, which typically use only 50 to 80 bytes. Since many OS-9 utilities are small, merging five, 10 or even 15 files into a single file allows those files to be placed in one 8K block. Even those of us with 512K CoCo 3s enjoy this memory saver.

So `OS9Boot` is simply one file into which all the system modules you will use are merged. The code that loads `OS9Boot` is rather simple, too. Consequently, make sure that `OS9Boot` is not divided into a number of places on your disk (OS-9 will split up a file if need be to make best use of disk space). When you make a new boot disk, use a freshly formatted disk to avoid this problem.

Shell

Under Level I, everything OS-9 needs should be included in `OS9Boot`. Once `OS9Boot` has been loaded, run the `StartUp` file. `StartUp` is a text file that contains commands you could have typed in at the OS9 prompt. Files of this nature are sometimes called procedure files or shell scripts.

Shell is a program that allows the computer to interpret any command entered into it. The logical people who wrote OS-9's interpreter named it *Shell*. OS-9's *Shell* normally takes its input from the keyboard, but it can take it from a text file as well. Think of all the commands that you can type at the OS9 prompt as a language. A text file of those commands would be like a program. In fact, Level II has a rich selection of graphics commands that can be entered at the OS9 prompt using `Display`. You could write a large text file of `Display` commands and generate a full-color picture, complete with text, using no "language" other than OS-9. The `StartUp` file can get quite long, particularly under Level II.

Under Level I, *Shell* is normally included in `OS9Boot`. This option uses the least memory. A different strategy applies under Level II. *Shell* is more a utility than a system module, and it does not need to be in the `OS9Boot`. No matter how much memory is in the computer, a 6809 microprocessor can deal with only 64K at a time. The CoCo 3 and OS-9 manage memory by switching 8K blocks in and out of the microprocessor's 64K "work space." If *Shell* is loaded separately from `OS9Boot`, it does not have to be in the "work space" at the same time as the boot modules. In this manner, the boot can contain other modules that need to be there. Thus, under Level II, *Shell* is loaded separately with a command included in the `StartUp` file and does not need to be in the `CMDS` directory of your boot disk, if a full path to it is provided in the `StartUp` file.

While *Shell* is less than 2K bytes, the `Shell` file supplied on the Level II system disk is really a merged file that includes several other frequently-used utilities, which almost fill an 8K block.

Another point at which Level II differs from Level I is the video and keyboard area. To take full advantage of CoCo 3 graphics and text options, additional code was needed. This code was divided among several modules. One such module, `GrfDrv`, is loaded separately and is not included in `OS9Boot`. `GrfDrv` is loaded immediately after `OS9Boot`, before the `StartUp` file. Consequently, it *must* be in the `CMDS` directory of your boot disk.

At this point, we know some of the things that must be on a boot disk. The Kernel must be on the 35th track on the front of the disk. On a single-sided disk, this is Track 34. On a double-sided disk, OS-9 counts the first track on the front as Track 0, the first track on the back as Track 1, etc., toward the center of the disk. In this case, Track 34 is not on the 35th top-side track. However, Disk BASIC does not know about double-sided disks. When you boot from a double-sided disk, it looks at the 35th top-side track for the Kernel. Boot-making utilities provided with Level I assume you are using single-sided disks and do not properly deal with double-sided disks even if you have replaced your standard disk I/O driver with one that uses double-sided disks. On the other hand, Level II utilities handle double-sided disks properly. In this case, the utilities provided with Level II

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are different from those of the same name in Level I.

The `OS9Boot` file must be a continuous file in the root directory. A `StartUp` file must also be in the root directory. There must be a `CMDS` directory on a Level II boot disk. `GrfDrv` and the `Shell` file must also be available for loading when the `StartUp` file runs.

The simplest way to make a new boot disk is to back up the one you already have. Naturally, you will have followed the directions in the documentation and backed up the operating system disk that comes with your OS-9. Right? Whenever you make a new boot disk, back it up as well.

Next you can use the program, *Cobbler. Cobbler* uses the system modules as they exist in memory at the time to make a new boot disk. Start with a freshly formatted disk. *Cobbler* will then copy the Kernel modules to the 35th top-side track and put all other modules loaded from `OS9Boot` into a new `OS9Boot`. The primary purpose of this program is to save changes made to descriptors with `Xmode`.

Most users will need to change `/t1`, `/t2` and `/p` from their defaults to match their current setups. `/t1` and `/t2` describe how the RS-232 ports work. One default setting is 300 baud. Most of us now use 1200 baud for telecommunications, and some use 2400 baud. If you want to run at a baud-rate higher than 300, include an `Xmode` command in your `StartUp` file to change `/t1` or `/t2` each time you boot. Similarly, few of us still run our printers at the 600-baud default. This can be changed by using `Xmode` on the `/p` descriptor. However, these changes only last through the current session and are lost as soon as you turn off your computer. When you use *Cobbler* to make a new boot disk, the descriptors in `OS9Boot` will include the modifications made using `Xmode`, so you can eliminate the `Xmode` steps from your `StartUp` file.

Using Dsave

The boot disk you make with *Cobbler* contains only the Kernel and `OS9Boot`. You must also add the remaining directories and files on your starting boot disk. To do this, use `Dsave`, which will copy or back up all files in one or more directories — including a whole disk. `Dsave` will not copy `OS9Boot` unless that option is specifically selected.

In addition, `Dsave` does not directly copy files; it makes a procedure file that you later run to do the job. There are a number of advantages to this procedure. You can edit the procedure file and eliminate copy commands for files you don't want to copy or add copy commands for files you want to copy from a disk in a different drive. Additionally, the copy or backup does not depend on the source and target disks being the same. Use this procedure file to make the 35-track system disk from your OS-9 package a double-sided 40-track boot disk, or to move the contents of a boot disk — excluding the Kernel, `Os9Boot` and `Grfdrv` — to a hard drive. To boot, most hard drive users load the Kernel, `OS9Boot` and `GrfDrv` from a floppy in `/d1`. After the initial loading, OS-9 discovers an `/h0` device descriptor and automatically continues the boot procedure from the hard drive.

When using `Dsave`, change your data directory to the one you want to copy. (The term *one or more directories* can mean a whole disk, since Directory `/d0` is the root directory of the disk in Drive 0, and all files and subdirectories on that disk are under the root directory.)

Next, determine which `Dsave` options you want to use. The only one we need to consider now is the 's' option. The format for this option is -s *integer*, where *integer* is the amount of memory, in kilobytes, you want to allocate to the copy process. The entry, -s20, will allocate 20K bytes, which will handle nearly all files on a boot disk. Now you may want to decide to which drive (and, possibly, to which directory on that drive) you want to copy. Finally, you need to name the procedure file `Dsave` will make and choose the drive and directory on which it will be stored.

Now, let's see how `Dsave` works. First, use *Cobbler* to put the Kernel and `OS9Boot` on a freshly formatted disk. Put the Level II system distribution disk in Drive 2. (Generally, you will find it more convenient to have your source disk in Drive 0.) Putting the disk in Drive 2 will better demonstrate the flexibility of `Dsave`. Next, type the following:

```
OS9:chx /d2/cmds
OS9:chd /d2
OS9:dsave -s20 /d2 /d0 >/d2/
    makecopy
```

Because the process requires the use of several program modules, the first line is used to change the current `CMDS` directory to `/d2`. The next line puts you in the root directory of `/d2`, from which you want to copy. The final line enters the `Dsave` command. Option -s20 tells `Dsave` to have `Copy` allocate 20K bytes of buffer for each copy operation. The descriptor, `/d2`, reminds `Dsave` that you want override the built-in `/d0` default and copy from Drive 2. The descriptor, `/d0`, tells `Dsave` to copy to drive 0 and to include a `chd /d0` line in the procedure file. Finally, `>/d2/make-copy` directs the resulting procedure into a file named `makecopy` on `/d2`. The following is a shortened version of the resulting procedure file:

```
  t
  chd /d0
  tmode .1 -pause
  load copy
  Makdir CMDS
  Chd CMDS
  Copy #20K /d2/CMDS/attr attr
  Copy #20K /d2/CMDS/backup
        backup
.
.
.
  Copy #20K /d2/CMDS/unlink
unlink
  Copy #20K /d2/CMDS/xmode
xmode
  Chd ..
  Makdir SYS
  Chd SYS
  Copy #20K /d2/SYS/errmsg
        errmsg
.
.
.
  Copy #20K /d2/SYS/stdptrs
stdptrs
  Chd ..
  Copy #20K /d2/startup start-
        up
.
.
.
  Copy #20K /d2/makecopy make-
copy
  unlink copy
  tmode .1 pause
```

In this file, `t` is a shell command that tells *Shell* to display each line in the procedure file on the screen so we can keep up to date on what is happening. `Tmode .1 -pause` tells *Shell* not to stop the display and the procedure after a certain number of lines are printed to the screen. The *Shell* default stops printing so you have time to see what was displayed and press ENTER to continue. The `.1` refers to the standard output to your screen. (Note at the bottom of the listing, `Tmode .1 pause` returns the pause feature.)

Next is a `Load Copy` command. Since `Copy` is used so often, it saves time to load it once and unlink it at the end of the procedure. If `Copy` is already loaded, the `Load` command increases its link count by one, and `Unlink` decreases the link count by one. `Copy` stays in memory. Next, `Makdir CMDS` creates a `CMDS` directory. `Dsave`'s default assumes that none of the needed directories on the target disk exist and that it will have to include commands to make these directories. This is exactly what we need here. The procedure file has used four OS-9 utilities: `Tmode`, `Load` and `Makdir`, which must either be in memory or in your current `CMDS` directory, and `Copy`. (Since the line `Load Copy` is used, OS-9 will try to load it from your `CMDS` directory whether it is in memory or not, so you must have `Copy` in your `CMDS`.) At the end of the procedure file, `Unlink` is used so it must be in memory or in the `CMDS` directory as well.

Having made a `CMDS` directory, `chd CMDS` makes that the current data directory and copying begins. Each `Copy` command includes `#20K`, which tells the program to use a 20K-byte buffer. We used the option -s20 to instruct `Dsave` to include this. Since `/d0/CMDS` is the current data directory, `Dsave` includes a full path (i.e., `/d2/CMDS/attr`) to the file to be copied; but since the file is being copied into the current data directory, `Dsave` needs only to provide the target file's name.

Most of the rest of the procedure file, except for `Chd ..`, is repetitious. The "`..`" is shorthand for "previous directory above the current one." When I started `Dsave`, my current data directory was `/d2`. Since the disk in `/d2` is the one I want to copy and I saved the procedure file, `makecopy`, onto that disk, I need only to put my target disk into `/d0`, type `makecopy` to start the procedure file, and get a drink or do something else while the process takes a few (long) minutes to run.

If you think this is easy, there is a better shortcut for those who don't want to edit the procedure file. Don't make a procedure file at all, just redirect the output for `Dsave` directly into *Shell* for immediate execution. Using our previous example, put the source disk in `/d2` and the target disk in `/d0`, and type the following:

```
OS9:chx /d2/cmds
OS9:chd /d2
OS9:dsave -s20 /d2 /d0 ! shell
```

Everything is the same in this second example except that `>/d2/makecopy` is replaced by `! shell`. The '`!`' is the set of pipe commands that routes the standard output of the foregoing process into the standard input of the following process. Look at page 6-41 in your Level II manual and circle the short paragraph that covers this, since you will certainly want to find it quickly in the future. When you type `Dir`, you get a listing on the screen of the names of the modules and directories in your current data directory. *However*, if you type `Dir e`, you will get that listing in much greater detail, including the date and time the file was saved, attributes of the file, the starting sector on the disk and the byte-count of the file. Well, the byte-count of *this* file has gotten large enough that I had better quit for this month.

My next column will cover the `OS9Gen` and `Config` processes for making a boot disk. We will also discuss the infamous, unsolvable, Level II boot order problem that has totally confounded all the experts since Level II for the CoCo 3 first came out. I will leave you pondering this enigma until next month.

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PCDUMP	display PC disk sector	**RSDUMP**	display RSDOS disk sector
PCREAD	read PC file	**RSREAD**	read file from RSDOS disk
PCWRITE	write file to PC disk	**RSWRITE**	write file to RSDOS disk
PCRENAME	rename PC file	**FLEXDIR**	directory of FLEX disk
PCDELETE	delete PC file	**FLEXDUMP**	display FLEX disk sector
PCFORMAT	format PC disk	**FLEXREAD**	read FLEX file
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KISSable OS-9

Installation, Automation and More

By Dale L. Puckett
Rainbow Contributing Editor

November is a good time to start some serious programming. I hope that this month's interview will help you get more enjoyment out of those long sessions with your CoCo.

CCEnv

Allow me to introduce a man who got tired of the complicated and redundant process required to compile C programs — and did something about it. Chris Fox has been programming since 1978 when someone gave him a Casio calculator that spoke BASIC. He started working with C four years later.

Fox bought a CoCo 2 with 16K of memory because he wanted to work with graphics and color. (It was also one of the only computers on the market he could afford.) He learned a lot with his CoCo 2, but he wanted to learn more. When OS-9 came out in 1983, he had to have it. When the Microware C compiler came out, he had to have that, too. The compiler was Fox's first experience with C language, and it took him a long time to learn the language and use the compiler. He explained: "I didn't have a second disk drive and didn't know I needed it. I really got things moving when I caught on and started using a RAM disk to compile my C programs. The RAM disk worked so well for me that I made it an automatic feature in *CCEnv*."

Fox wrote *CCEnv* because he was tired of the long directory names and command line options used to run the OS-9 text editor. *CCEnv* eliminated these length requirements.

Yet, *CCEnv* works with almost all OS-9 languages. You can run your Pascal compiler with it — or use it to assemble programs written for `ASM` or `RMA`. The *CCEnv* manual pages will even clip into your *Multi-Vue* manual.

An intelligent project manager is built into the program. "It's a graphics `Make`," Fox said. "It checks the date. If a text file has been updated, it's recompiled. If you have enabled the project option, *CCEnv* links to any relocatable object code you have written during the programming project. It automatically uses the startup code in `CStart.r` and the standard library, so you can split your programming projects into segments."

Fox's company, Foxware, sells a graphics library that works with `C.Link` in the original C compiler package and a C math library. Fox also offers a BASIC09 math library, and a BASIC09 mouse and menu library that help you create mouse-driven applications with pull-down menus. The latter contains many routines similar to the *Gfx3* package published in last month's column.

The Foxware graphics library includes a function that returns a pointer to the device name string. This makes it easier to use redirection from within your own program. While you can issue a fork call without the *devname* function, you can't redirect any output. To do that, you must know the name of the device receiving the output, not just the path number. *Devname* enables dynamic redirection — you can find an available window and redirect output to it immediately. The graphics library also includes a function that calls the device `/w` and returns the path number for you.

Essentially, *CCEnv* is a graphics driver for OS-9 compilers and assemblers, which lets you issue commands with a mouse-and-menu and eliminates long command lines. It also remembers compiler options and keeps track of your directories.

Chris Fox guarantees that there will be at least one less manual open on your lap when you use *CCEnv* to program. Fox used the Microware C compiler for more than a year before he tried *Turbo C* (one of the most convenient MS-DOS C compilers). He was struck by the ease of program development and determined to develop something similar for the CoCo 3.

Although Fox bought an IBM-compatible computer and intended to move on to the more *sophisticated* PC, it never happened. Fox explained, "After investing a few months to learn DOS, I realized that OS-9 is a superb operating system. I preferred the CoCo 3." Fox now uses his Tandy 1000 TX almost solely as a terminal for his CoCo 3 when he runs OS-9 Level 2.

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP: on packet-radio, K0HYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.

After working on *CCEnv* for a few months, Fox began to use the half-finished program to complete itself. "The results were so pleasing that I decided to generalize *CCEnv* so it could run all OS-9 compilers and assemblers," he said. Fox also realized that this program, which had been developed for his own convenience, would be useful for other programmers as well.

Equipment

To run *CCEnv*, you'll need OS-9 Level II and the `WindInt` system module that comes with *Multi-Vue*. The program runs under *Multi-Vue* but can be run independently if `WindInt` is in your `OS9Boot` file. You will also need a mouse and 512K of memory. Compiling a program on the CoCo 3 without a RAM disk is a slow process. Therefore, *CCEnv* automatically writes all temporary files to the drive, `/r0`, if it is available. If that driver is not available, the program will prompt you for a drive name or directory. *CCEnv* will remember this location in its environment file, so you won't need to type it again until you want to change directories.

You must also supply your own OS-9 compiler, assembler and text editor. *CCEnv* is pre-configured for the Microware C compiler but works well with Pascal, `ASM`, `RMA` and `C.ASM`. The *CCEnv* edit menu offers four text editors: *Edit*, *Scred*, *TSEdit* from Tandy and *Xed* from MicroTech Consultants. If you don't own one of these, a fifth menu entry lets you specify your own editor.

To run *CCEnv*, copy two files to your OS-9 system disk. *CCEnv* goes in your `CMDS` directory. `Env.ccenv` goes in `/DD/SYS`. Make sure that any programs *CCEnv* will use are also in your `CMDS` directory. For example, the editor you plan to call from the menu and all the files in the Microware C compiler (except `cc1`) must be in `CMDS`. Additionally, you'll need the utilities you use during a programming session: `Attr`, `Dump`, `Debug`, `Verify` and `Tmode`.

If you would rather not clutter your `CMDS` directory, create a special directory for *CCEnv*, load it with your compiler files, editor and utilities, and change your current execution directory to the special *CCEnv* directory. You can do this before you run the program or from within the program itself; however, include the `StdPtrs` and `StdFonts` files in your `/dd/SYS` directory.

If you look in your modules directory after loading *CCEnv*, you'll see two new modules — `CCEnv` and `ShellCmd`. Run `CCEnv` by typing:

```
CCEnv pathlist options. . .
```

When *CCEnv* sees a hyphen, it knows that it has found an option. Otherwise, it treats a name on your command line as a pathlist to the file you want to compile or assemble. *CCEnv* uses the data directory holding the file you are compiling as its current data directory. Here's a typical *CCEnv* command line.

```
CCEnv filename -v
```

Type this line when you want to run a single session to compile an existing C or assembly program. To configure *CCEnv* to run OS-9 Development Kit assembler, type:

```
CCEnv -a -l -x=startup.a
- z=stdlib.asm -v=env.assm
```

When you type this line, *CCEnv* uses `RMA` to assemble your file and `RLINK` to link your object code. The program substitutes the assembly startup code for `CStart.r` and the standard library for `CLib.l`, and it saves the options you typed in an environment file, — `Env.Assm`. The next time you want to work with your assembler, just type:

```
CCEnv -v=env.assm
```

You can save as many environment files as you like. In fact, you can keep one for each program you develop. (*CCEnv* will automatically keep track of the libraries and other relocatable modules needed for each project.) Store these environment files in your `/dd/SYS` directory.

Menus

You'll find six menus on *CCEnv's* main menu bar — Close (a square box), File, Edit, Run, Compile and Option. If you are working with a binary file — a file with an `.r` or no extension — you'll notice that a Module menu replaces the Edit menu. From this menu, you can `Debug` or `Attr` your object code file.

Pop-up menus ask you for information when it's needed. For example, if you name a file with an unrecognized extension, you'll be asked to identify its type. Generally, a pop-up menu will ask Yes or No questions. If *CCEnv* needs a longer answer, it will request the answer in a dialog-box. Essentially, this is the only time you'll use your keyboard while running *CCEnv*. The rest of the time you can just click the mouse. For example, if your compiler runs into an error, you'll find out about it in a message box. After you read the note, click the mouse and the message box disappears. Inappropriate menus are disabled. Thus, if you have not picked a file to edit, the Edit, Run and Compile menus will be disabled.

The File menu allows the following options: Load a file. (You may choose

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any available in the present environment.) Abandon the file you are using. Count the characters, words and lines in a file, or check its syntax. Start an OS-9 Shell on another screen, or exit *CCEnv*. The Edit menu lets you select the editor to be used for a session. If you receive an error message during an assembler or compiler run, a two-window screen will appear on your CoCo. The possible error messages will appear in the six-row window at the bottom of the screen. You can then use them to correct the file in the top window. (This is certainly better than relying on my short memory.)

The Run menu runs the program you just compiled. If the file hasn't been compiled or assembled, *CCEnv* will do this for you and then run the program. This menu will compile, assemble, link and run a program with *one* mouse click.

The Compiler menu gives you four choices:

- `To Assembly` generates an assembly language file after compiling your C source code.
- `To Object` converts your assembler, or C source code, to a relocatable object code file with an `.r` extension.
- `To Executable` takes your C (assembly, or relocatable object) code file and produces an executable module, linking the new object code to other relocatable code listed in your link list. The file created is automatically stored in your execution directory.
- `To Cancel` lets you change your mind.

The `Assembler`, `Compiler` or `Linker` options from the options menu will show you *CCEnv*'s pull-down menus. Center the mouse over your selection and click the button. Without moving the mouse, you will now see a second menu. For example, if you click over the word Compiler, you'll be offered three choices in a pull-down menu: optimize defaults, check the 6809 stack, or run the C Profiler. You are presented similar choices when you click on `Assembler`, `Linker`, `Link-List` or `Libraries`.

CCEnv was created to make programming less tedious and more productive. It fills that bill nicely.

About Assemblers

I received an interesting note from Duane M. Perkins of Mount Gretna, Pa. He suggested that I point out the advantages of `RMA` — the Relocating Macro Assembler found in OS-9 Level II's Software Development package — over `ASM` — OS-9 Level I's original assembler.

`RMA`'s main advantage is that it creates object files that can be linked with others later. According to Perkins: "The ability to include assembled functions and subroutines in a module speeds up program development."

Perkins submitted two short — but interesting and useful — listings to make his point: `ClkSpd` and `ClkChk`. `ClkSpd`, used with one of your programs, determines the clock speed of your CoCo 3. This information is essential if your program uses timing loops and must ensure a correct delay interval. `ClkSpd` calls `ClkChk`, which determines whether the clock speed is fast or slow and then tells you through a printed message.

You cannot directly execute a file created by the `RMA` assembler. It must be linked before it is run. However, you can assemble any number of source code files independently and use your linker to create an executable module that includes all of them. The linker also lets you use libraries, which can contain any number of independently assembled files. When you have finished this work with `RMA`, you will never have to do it again.

Some of the directives used in an `RMA` program are different than those used in an `ASM` program. For example, an `RMA` program uses `Psect` instead of `Mod` and `Endsect` instead of `Emod`. Another directive, `Csect`, marks the beginning of a data section and resets the base location counter for data offsets like `ASM`'s directive, `Org`. In an `RMA` program, all data sections must end with an `Endsect` directive, and all `rmb` statements must be located in a `Csect`. Also, while your program may have any number of `Csects`, it can have only one `Psect`. Incidentally, `RMA` labels are case-sensitive. You'll need to be careful when typing the names of your subroutines and variables. Tandy supplies a file named `OS9Defs.a` that contains the standard OS-9 variables in the required `Csect` or `Endsect` format. Make sure that the labels used in your source code agree with the listing in this file — letter for letter.

The first module you link must con-

Listing 1: `ClkSpd`

```
  ifpl
  use /dd/defs/os9defs.a
  endc

      psect clkspd,$11,$81,0,200,Enter
Fast  fcc /Clock is fast/
      fcb $0D
Slow  fcc /Clock is slow/
      fcb $0D
Enter lbsr Clkchk
      tsta
      bne Skipl
      leax Slow,pcr
      bra Skip2
Skipl leax Fast,pcr
Skip2 ldy #32
      lda #1
      os9 I$WritLn
      os9 F$Exit
      endsect
```

Listing 2: `ClkChk`

```
  ifpl
  use /dd/defs/os9defs.a
  endc

      psect Clkchk,0,0,0,0,Clkchk
Clkchk:
      orcc #$50
      lda $FF02
      sync
      lda $FF02
      ldd #2542
Clkchkl subd #1
        bne Clkchkl
        clra
        ldb $FF03
        andcc #$AF
        bmi Clkchk2
        inca
Clkchk2 ldb $FF02
        rts
        endsect
```

Listing 3: `DoMenu`

```
PROCEDURE DoMenu
 0000      (* Adding functionality to MVShell
 0022      (*
 0025      (* Window menu data structures
 0043      TYPE Mistr=_mnttl:STRING[15]; _mienbl:BYTE; _mires(5):BYTE
 0064      DIM MidScr:Mistr
 006D
 006E      (* The next structure holds the definition of a menu.
 00A3      TYPE mnstr=_mittl:STRING[15]; _mnid,_mnxsiz,_mnnits,_mnenabl

            :BYTE; _reser2,_mnitems:INTEGER
 00CF      DIM MNDscr:mnstr
 00D8
 00D9      (* The final structure defines the contents of an entire window.
0119      TYPE wnstr=_wnttl:STRING[20]; _nmens,_wxmin,_wymin:BYTE; _wnsync

           :INTEGER; _wnres(7):BYTE; _wnmen:INTEGER
014E      DIM WndScr:wnstr
0157
0158      (* Now we set up our intercept code
017B      TYPE IntCeptCod=StBCode:BYTE; IntAddr:INTEGER; RTICode,IntResult

           :BYTE
0196      DIM IceptCode:IntCeptCod
019F
01A0      IceptCode.StBCode:=$F7
01AC      IceptCode.IntAddr:=ADDR(IceptCode)+4
01BD      IceptCode.RTICode:=$3B
01C9
01CA      (* We must also define a data type to hold the 6809 registers
0207      TYPE Registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
022C      DIM Regs:Registers
0235
0236      (* We must also tell our program what the mouse looks like.
0271      TYPE rodent=valid,actv,totm:BYTE; rsrv0:INTEGER; ttto:BYTE; tsst

           :INTEGER; cbsa,cbsb,ccta,cctb,ttsa,ttsb,tlsa,tlsb:BYTE

           ; rsrvl,bdx,bdy:INTEGER; stat,res:BYTE; acx,acy,wrx,wry

           :INTEGER
02E2      DIM msret:rodent
02EB
02EC      (* To enhance readability
0305
0306      DIM Menu_ID,Menu_Item:INTEGER
0311      DIM DoMenuItem,IgnoreMenu,DoContent:BOOLEAN
0320      DIM F_Icpt,F_Sleep:BYTE
032B      DIM I_Getstt,SS_MnSel,I_Dup:BYTE
033A      DIM I_SetStt,SS_MsSig,StdIn,StdOut,SS_GIP,SS_Mouse:BYTE
0355      DIM thePath,MouseSig,Follow,HorPos:INTEGER
0368      DIM Grp_Ptr,Ptr_Arr:BYTE
0373      DIM oldpath(3),newpath:BYTE
0383      DIM action:STRING
038A
038B      DoMenuItem:=FALSE \DoContent:=FALSE \IgnoreMenu:=FALSE
039D      Grp_Ptr:=202 \Ptr_Arr:=1 \F_Icpt:=$09
03B3      F_Sleep:=$0A \I_Getstt:=$8D \I_SetStt:=$8E
03CB      SS_MsSig:=$8A \SS_MnSel:=$87 \SS_GIP:=$94
03E3      SS_Mouse:=$89 \Follow:=1 \StdIn:=0
03F9      StdOut:=1 \MouseSig:=10
0407      I_Dup:=$82
040F
0410      DIM EndStr:STRING[1]
041C      DIM Null,CallCode,FunCode:BYTE
042B      Null:=0
0432      EndStr:=CHR$(Null)
043B
043C      (* Window type defs.
0450      DIM WT_NBox,WT_FWin,WT_FSWin,WT_SBox,WT_DBox,WT_PBpox:INTEGER
046B      WT_NBox:=0 \WT_FWin:=1 \WT_FSWin:=2
0480      WT_SBox:=3 \WT_DBox:=4 \WT_PBox:=5
0496
0497      DIM MNEnbl,MNDsbl:BYTE
04A2      MNEnbl:=1 \MNDsbl:=Null
04B1
04B2      DIM WINSync:INTEGER
04B9      WINSync:=$C0C0
04C1
04C2      DIM MN_Move,MN_Clos,MN_Grow,MN_Uscrl,MN_Dscrl,MN_Rscrl,MN_Lscrl

           :BYTE
04E1      DIM MN_Tndy,MN_File,MN_Edit,MN_Styl,MN_Font,MN_Char:BYTE
04FC      MN_Move:=1 \MN_Clos:=2 \MN_Grow:=3 \MN_Uscrl:=4
0518      MN_Dscrl:=5 \MN_Rscrl:=6 \MN_Lscrl:=7
052D      MN_Tndy:=20 \MN_File:=21 \MN_Edit:=22
0542      MN_Styl:=23 \MN_Font:=24 \MN_Char:=8
0557
0558      (* Here are some more definitions you'll need in almost all of your
059B      (* Basic09 / Multi-Vue application programs.  This group takes care
05DE      (* of the many buffers used within OS-9 Level II.
060F
0610      DIM Grp_Font,Grp_Clip,Grp_Pat2,Grp_Pat4,Grp_Pat6:BYTE
0627      DIM Fnt_S8x8,Fnt_S6x8,Fnt_G8x8:BYTE
0636      DIM Ptr_Pen,Ptr_Lch,Ptr_Slp,Ptr_Ill,Ptr_Txt,Ptr_Sch:BYTE
0651      DIM WR_Cntnt,WR_Cntrl,WR_OfWin:BYTE
```

tain your main program *with* the module entry point. It must be assembled with a non-zero type/language code. Modules that you plan to link with this first module must have the type/language byte set to zero. Any location in your modules that you want to reference from another module must have a label ending with a colon. Thus, any variable name that ends with a colon will be recognized globally when you run your linker.

Procedure *Files*

I was happy to hear about Gil Shattuck's File Transfer Utilities at RAINBOWfest Chicago. I was even happier when I received a copy of Gil's latest version, based on *Multi-Vue*. However, I was delighted when I put the disk in Drive `/d0` and clicked on the *Multi-Vue* icon.

There were two procedure files on the disk from Granite Computer Systems, so I pointed to the first with the mouse and clicked to select it. I moved the pointer to the File menu and listed the file. It was an installation file. One of the procedure files Shattuck provides loads `FTU` from the GCS master disk to your system disk in Drive `/d0`. The other procedure copies the files to the disk in Drive `/h0`. I use `/h0` and *GShell+* from the OS-9 Users Group, so I clicked on the second procedure file's icon and returned to the keyboard to write a few more sentences. While I worked, *GShell+* ran the procedure file. In a few minutes, Shattuck's `FTU` was installed.

The procedure file supplied by GCS moved the file, `AIF.ftu`, to my `CMDS` directory. When it had finished, I copied that file to the directory where I group my `AIF` files. I then clicked on the update bar (located just below the *Multi-Vue* menu bar) and, like magic, the `FTU` icon appeared on my screen. (I capitalize the letters "AIF" in my file names and use the *GShell+* sort routine so that the icons used with my most frequently run programs are placed at the top of the screen and sorted in alphabetical order. My CoCo 3 is turning into a dream computer.)

As soon as the `FTU` icon appeared, I clicked it on. A new screen with a pleasant border color and a standard *Multi-Vue* framed window with a five-item menu bar appeared on the screen. The standard Close box appears to the left of the menu, followed by a Quit menu that lets you exit `FTU` *immediately*. Three menus unique to `FTU` appeared to the right. These are PC

Transfer, RS-DOS *Transfer* and FLEX Transfer. I took an old FLEX disk and an MS-DOS disk and tried the different menus.

You may notice that I haven't mentioned the manual. That's because I haven't read at it yet. I like to try software before I read the manual. The `FTU` manual is clear, complete, concise and quite useful. My only problem occurred because I had booted my CoCo 3 with an `OS9Boot` file containing `CC3Disk` instead of `SDisk3`, and GCS `FTU` requires Dan Johnson's `SDisk3` package.

Shattuck has put a lot of thought into this utility package. For example, if you put a new FLEX, PC or Disk BASIC disk in Drive `/d0` and click on the appropriate menu title in the pull-down menu, a list of the files on that disk will appear instantly on your CoCo 3 screen. You can even ask for an extended directory listing that gives you the size and age of the files you might want to transfer.

One of the best features of this utility occurs when you are ready to read one of these foreign files. You just click on the proper menu title, move the pointer down and click on the "Read File" selection. `FTU` immediately presents a dialog box in the lower right hand corner of your screen, so you can type in any additional information it might need. Never fear, you won't need to remember a filename — or the file's extension — with this program. GCS leaves the directory listing on the screen so you can refer to it while you type the name of the file you want to transfer. The small dialog box doesn't get in the way at all. Nice job, Gil!

Speaking of File Transfers . . .

Recently, Jane C. Sherratt of Omaha, Neb., who uses *VIP Database* and *VIP Calc* packages and has many ASCII files, wrote to ask how she could read these files into an OS-9 word processing package to avoid retyping all the numbers. Sherratt can use a package like GCS's File Transfer Utilities to move the files from her Disk BASIC disks to an OS-9 disk. Once she has the files stored on an OS-9 disk, she should be able to open them with most OS-9 editors and word processors. Many of them recognize tabs, so the formatting from her spreadsheets should stay intact. She may even be able to load the ASCII data from *VIP Calc* into *Dyna-Calc*.

Even straightforward BASIC programs — those that do not use commands unique to Color Computer

```
0660        DIM Pat_Sld,Pat_Dot,Pat_Vrt,Pat_Hrz,Pat_Xhtc,Pat_Lsnt:BYTE
067B        DIM Pat_Rsnt,Pat_Sdot,Pat_Bdot:BYTE
068A
068B        (* First, the Buffer Numbers
06A7        Grp_Font:=200 \Grp_Clip:=201 \Grp_Ptr:=202
06BC        Grp_Pat2:=203 \Grp_Pat4:=204 \Grp_Pat6:=205
06D1
06D2        (* The Font Buffers
06E5        Fnt_S8x8:=1 \Fnt_S6x8:=2 \Fnt_G8x8:=3
06FA
06FB        (* The Mouse Pointer Buffers
0717        Ptr_Arr:=1 \Ptr_Pen:=2 \Ptr_Lch:=3 \Ptr_Slp:=4
0733        Ptr_Ill:=5 \Ptr_Txt:=6 \Ptr_Sch:=7
0748
0749        (* The Window regions for the Mouse
076C        WR_Cntnt:=0 \WR_Cntrl:=1 \WR_OfWin:=2
0781
0782        (* The Pattern Buffers
0798        Pat_Sld:=0 \Pat_Dot:=1 \Pat_Vrt:=2 \Pat_Hrz:=3 \Pat_Xhtc:=4
07BB        Pat_Lsnt:=5 \Pat_Rsnt:=6 \Pat_Sdot:=7 \Pat_Bdot:=8
07D7
07D8        DIM _update,wxmin,wymin,timout,cur_wind,moussig,miscsig,wait

              :BYTE
07FB        DIM sigcode,status,wpath:INTEGER
080A
080B        wxmin:=40 \(* minimum screen width for our window
0838        wymin:=24 \(* minimum screen height
0857
0858        _update:=3 \(* update rate for the mouse
087B        timout:=10 \(* timeout between clicks
089B        Follow:=1 \(* update cursor when mouse moves, 0 for no follow.
08D5
08D6        cur_wind:=0 \(* flag to fork a process on current window
0908        moussig:=10 \(* signal code returned by the mouse when
0938        miscsig:=15 \(* miscellaneous signal code
095B        wait:=20 \(* signal code to wait for button to be pressed
0991
0992        (* After we define -- or "type" -- the special data structures
09D0        (* we need for a Multi-Vue based program, we must initialize
0A0C        (* the data in those structures.
0A2C
0A2D        DIM _tanitms(9):Mistr
0A3B        _tanitms(1)._mnttl:="Calc"+EndStr \_tanitms(1)._mienbl:=MNEnbl
0A5E        _tanitms(2)._mnttl:="Clock"+EndStr \_tanitms(2)._mienbl:=MNEnbl
0A82        _tanitms(3)._mnttl:="Calendar"+EndStr \_tanitms(3)._mienbl:=MNEnbl
0AA9        _tanitms(4)._mnttl:="Control"+EndStr \_tanitms(4)._mienbl:=MNEnbl
0ACF        _tanitms(5)._mnttl:="Printer"+EndStr \_tanitms(5)._mienbl:=MNEnbl
0AF5        _tanitms(6)._mnttl:="Port"+EndStr \_tanitms(6)._mienbl:=MNEnbl
0B18        _tanitms(7)._mnttl:="Help"+EndStr \_tanitms(7)._mienbl:=MNDsbl
0B3B        _tanitms(8)._mnttl:="Shell"+EndStr \_tanitms(8)._mienbl:=MNEnbl
0B5F        _tanitms(9)._mnttl:="Clipboard"+EndStr \_tanitms(9)._mienbl

              :=MNDsbl
0B87
0B88        DIM _filitms(6):Mistr
0B96        _filitms(1)._mnttl:="New"+EndStr \_filitms(1)._mienbl:=MNDsbl
0BB8        _filitms(2)._mnttl:="Open"+EndStr \_filitms(2)._mienbl:=MNDsbl
0BDB        _filitms(3)._mnttl:="Save"+EndStr \_filitms(3)._mienbl:=MNDsbl
0BFE        _filitms(4)._mnttl:="Abandon"+EndStr \_filitms(4)._mienbl:=MNDsbl
0C24        _filitms(5)._mnttl:="Print"+EndStr \_filitms(5)._mienbl:=MNDsbl
0C48        _filitms(6)._mnttl:="Quit"+EndStr \_filitms(6)._mienbl:=MNEnbl
0C6B
0C6C        DIM _editms(6):Mistr
0C7A        _editms(1)._mnttl:="Undo"+EndStr \_editms(1)._mienbl:=MNDsbl
0C9D        _editms(2)._mnttl:="Cut"+EndStr \_editms(2)._mienbl:=MNDsbl
0CBF        _editms(3)._mnttl:="Copy"+EndStr \_editms(3)._mienbl:=MNDsbl
0CE2        _editms(4)._mnttl:="Paste"+EndStr \_editms(4)._mienbl:=MNDsbl
0D06        _editms(5)._mnttl:="Clear"+EndStr \_editms(5)._mienbl:=MNEnbl
0D2A        _editms(6)._mnttl:="Show"+EndStr \_editms(6)._mienbl:=MNDsbl
0D4D
0D4E        (* Now we'll set up the entire menu
0D71
0D72        DIM Tndy_Mn:mnstr
0D7B        Tndy_Mn._mittl:="Tandy"+EndStr \Tndy_Mn._mnid:=MN_Tndy
0D9B        Tndy_Mn._mnxsiz:=10 \Tndy_Mn._mnnits:=9
0DB1        Tndy_Mn._mnenabl:=MNEnbl \Tndy_Mn._mnitems:=ADDR(_tanitms)
0DCB
0DCC        DIM File_Mn:mnstr
0DD5        File_Mn._mittl:="Files"+EndStr \File_Mn._mnid:=MN_File
0DF5        File_Mn._mnxsiz:=10 \File_Mn._mnnits:=6
0E0B        File_Mn._mnenabl:=MNEnbl \File_Mn._mnitems:=ADDR(_filitms)
```

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BASIC — can be transferred over to an OS-9 file and run with BASIC09. To do this, make sure that you save the source code of your Disk BASIC file in ASCII. Before you attempt to load the file into BASIC09, however, use your favorite editor to insert the line:

```
PROCEDURE nameofprogram
```

at the front of your *Disk BASIC* program. (The 'P' must be the *first* character in the file.)

> ***"Error 221 means OS-9 couldn't locate the module requested, while Error 249 means the disk inserted in a drive isn't compatible with the drive's present configuration."***

Getting Started With *Multi-Vue*

Melvin Grow in Alameda, Calif., wrote to ask for help in starting *Multi-Vue*. In its present format, he can't access his files in Drive 1. Having transferred all his OS-9 files to a 40-track disk, Grow finds *Multi-Vue* unfriendly, and wonders why Tandy used `BuildMV` instead of *Config* so that users could match their hardware configuration.

Grow reported receiving the infamous 221 and 249 errors. Let's look at those first. Error 221 means that OS-9 could not locate the module requested. Error 249 means that the disk inserted in a drive is not compatible with the present configuration of the drive (i.e., you would get Error 249 if you inserted a double-sided disk in a drive with its device descriptor configured for single-sided disks. My hardware setup is also a hybrid and would not work with `BuildMV`. When I couldn't run `BuildMV` the first time, I just installed *Multi-Vue* myself. Grow may also find this approach simpler. To see if we can solve his problem, however, let's look at `BuildMV`.

To begin, the procedure file saves most of the modules that it expects in your OS-9 Level II boot file to a `MODULES` directory. This directory is on the reverse side of the *Multi-Vue* release disk from Tandy. Mount this disk in Drive `/d0`.

```
0E25
0E26        DIM Edit Mn:mnstr
0E2F        Edit_Mn._mittl:="Edit"+EndStr \Edit_Mn._mnid:=MN_Edit
0E4E        Edit_Mn._mnxsiz:=10 \Edit_Mn._mnnits:=6
0E64        Edit_Mn._mnenabl:=MNEnbl \Edit_Mn._mnitems:=ADDR(_editms)
0E7E
0E7F        (* Now that we have defined the items in the menu and the menu itself,
0EC5        (* we can define the window that we want the menu to appear in.
0F04
0F05        DIM Menus(3):mnstr
0F13
0F14        Menus(1):=Tndy_Mn \Menus(2):=File_Mn \Menus(3):=Edit_Mn
0F35
0F36        WndScr._wnttl:="KISSDraw"+EndStr \WndScr._nmens:=3
0F58        WndScr._wxmin:=80 \WndScr._wymin:=24
0F6E
0F6F        (* _wnres, an array of seven reserved bytes, sits here
0FA5        WndScr._wnsync:=WINSync \WndScr._wnmen:=ADDR(Menus)
0FBF
0FC0        (* Let's create a window
0FD8
0FD9        RUN Gfx2(StdOut,"CurOff")
0FEC        RUN gfx3(StdOut,"ss.wnset",ADDR(WndScr),WT_FSWin)
100C        RUN gfx3(StdIn,"ss.gip",$0101,$FFFF)
1027        RUN gfx3(StdIn,"ss.mous",$0301,Follow)
1044
1045        (* Now we can the call to set up the intercept.
1074
1075        CallCode:=F_Icpt
107D        Regs.x:=ADDR(IceptCode)
108B        Regs.u:=ADDR(IceptCode)+4
109C        RUN SysCall(CallCode,Regs)
10AB
10AC        RUN Gfx2("gcset",Grp_Ptr,Ptr_Arr)
10C3
10C4        (* The main loop of our program starts here
10EF
10F0        LOOP  \(* Do this forever
1104
1105          PRINT
1107          PRINT "Type <Control E> or <BREAK> to stop !!!"
1132
1133          IceptCode.IntResult:=0 \(* Initialize Signal Report
1159          RUN gfx3(StdIn,"ss.msig",MouseSig)
1172
1173          (* Now we must tell the process to go to sleep until
11A7          (* it receives a signal to wake up.
11CA
11CB          CallCode:=F_Sleep
11D3          Regs.x:=0 \(* Sleep forever -- at least till signal
1206          RUN SysCall(CallCode,Regs)
1215
1216        EXITIF IceptCode.IntResult=2 THEN  \(* Escape with BREAK key
123D        ENDEXIT
1241
1242          IF IceptCode.IntResult=MouseSig THEN
1252            RUN gfx3(StdIn,"gs.mous",ADDR(msret)) \(* Go Read Mouse
127C            IF msret.stat=WR_Cntrl AND msret.cbsa<>0 THEN
1296              DoMenuItem:=TRUE
129C            ELSE
12A0              DoMenuItem:=FALSE
12A6            ENDIF
12A8          ENDIF
12AA
12AB          IF DoMenuItem=TRUE THEN
12B6            RUN gfx3(StdIn,"ss.mnsel",Menu_ID,Menu_Item)
12D5            PRINT "The Menu ID is "; Menu_ID
12EC            PRINT "The Menu Item is "; Menu_Item
1305
1306            IF Menu_ID<>0 THEN
1312              GOSUB 1000 \(* Go handle menus
1328            ENDIF
132A          ENDIF
132C
132D        ENDLOOP
1331
1332        (* Your Program code that deals with events
135D        (* in the content region of the window goes here.
138E
```

```
138F      END
1391
1392 1000 IF Menu_ID=MN_Clos OR Menu_ID=MN_File AND Menu_Item=6 THEN
13B1        action:="Alert"
13BD        RUN DoAlert(action,"Quit Demo? ","Yes      ","","No      ",ADDR

             (WndScr))
13F1        IF LEFT$(action,3)="Yes" THEN
1403          PRINT "Thank you for trying DoMenu"
1422          GOTO 9999
1426        ENDIF
1428      ELSE
142C        IF Menu_ID=MN_Tndy THEN
1439          RUN Gfx2("gcset",Grp_Ptr,Ptr_Arr)
1450          RUN Gfx2("curoff")
145E          ON Menu_Item GOSUB 1110,1120,1130,1140,1150,1160,1170,1180

               ,1190
1489        ELSE
148D          IF Menu_ID=MN_Edit AND Menu_Item=5 THEN
14A1            PRINT CHR$($0C);  \(* Clear Screen
14B7          ENDIF
14B9        ENDIF
14BB      ENDIF
14BD      RETURN
14BF
14C0 1110 (* Calc
14CA      RUN Gfx2("OWSet",1,0,1,36,12,0,1)
14EC      SHELL "gcalc"
14F5      RUN Gfx2("OWEnd")
1502      RETURN
1504
1505 1120 (* Clock
1510      RUN Gfx2("OWSet",1,0,1,30,12,0,1)
1532      GOSUB 2000 \(* Draw nice looking box
154E      SHELL "gclock"
1558      GOSUB 3000 \(* Close box
1568      RETURN
156A
156B 1130 (* Calendar
1579      (* To run this desk accessory, you must dup the old standard
15B5      (* paths, close them, and dup new windowpath into them.  After
15F3      (* you run gcal, you must restore the old paths
1622
1623      BASE 0
1625      OPEN #newpath,"/w"
1630      RUN Gfx2(newpath,"DWSet",6,0,0,40,24,0,1,2)
165A      PRINT #newpath,CHR$($1B); CHR$($21);  \(* select the window
167F      FOR thePath=0 TO 2
168F        Regs.a:=thePath
169B        RUN SysCall(I_Dup,Regs)
16AA        oldpath(thePath):=Regs.a
16B9        CLOSE #thePath
16BF        Regs.a:=newpath
16CB        RUN SysCall(I_Dup,Regs)
16DA      NEXT thePath
16E5
16E6      SHELL "gcal"
16EE
16EF      FOR thePath=0 TO 2
16FF        CLOSE #thePath
1705        Regs.a:=oldpath(thePath)
1714        RUN SysCall(I_Dup,Regs)
1723        CLOSE #oldpath(thePath)
172C      NEXT thePath
1737      PRINT #0,CHR$($1B); CHR$($21);  \(* re-select standard paths
1762      CLOSE #newpath
1768      BASE 1
176A      RETURN
176C
176D 1140 (* Control
177A      GOSUB 4000 \(* Go open overlay window
1797      SHELL "Control"
17A2      GOSUB 3000 \(* Close overlay window
17BD      RETURN
17BF
17C0 1150 (* Print
17CB      GOSUB 4000 \(* Open overlay window
17E5      SHELL "gprint"
17EF      GOSUB 3000 \(* Close overlay window
```

Next, `BuildMV` prompts you to copy the modules `term.wind.dt` and `CC3go` from the `MODULES` directory on your OS-9 *Config* disk to the `MODULES` directory on the reverse side of the *Multi-Vue* release disk. When this is complete, `BuildMV` copies the `GrfDrv` file from your original OS-9 system disk to the `CMDS` directory on the reverse side of the *Multi-Vue* release disk.

After it moves the files, `BuildMV` changes its current data directory to the `MODULES` directory and runs the `OS9Gen` utility to create a new `OS9Boot` file.

The procedure file is complicated by several factors. First, `BuildMV` expects you to copy to a single disk, using only Drive `/d0`. Second, it expects to find the needed modules in your `OS9Boot` file. If you have a hybrid system, this may not be the case, and you will receive the Error 221 message.

Evidently, Grow also received an Error 249 message when he tried to copy the files from his double-sided disk, which the procedure file had instructed him to mount in Drive `/d0`. Since *Multi-Vue* instructed him to boot with his original OS-9 system disk, he was running a single-sided device descriptor in Drive `/d0` that could not read the double-sided disk containing the files. Therefore, he received an Error 249.

I will now attempt to make *Multi-Vue*'s installation process easier to understand. Start by listing the `MODULES` and `CMDS` directories on the reverse side of the *Multi-Vue* release disk (the side the instructions tell you to use). In the `MODULES` directory you'll find a `HELP` directory, a `WindInt.io` module, eight new window device descriptors and a file named `Bootlist.mv`.

Because you use the bootlist file to tell `OS9Gen` which modules you want in your new `OS9Boot` file, we'll need to look at that file as well. When `Bootlist.mv` is listed, it will instruct `OS9Gen` to use the files that `BuildMV` attempted to save for you, as well as the modules on the reverse side of the *Multi-Vue* release disk, in the `MODULES` directory.

You will need to copy the `CC3go` module from the `MODULES` directory on your *Config* disk because the copy in memory is marked busy and cannot be saved with the OS-9 save command. If you try, you will receive an Error 209, or "Module Busy," message. Copy `term-wind.dt` from the *Config* disk as well because it does not exist in the `OS9Boot` file of the standard OS-9 Level II release disk, which `BuildMV` expects you to use.

After looking at this procedure, you may feel that things should not be this complicated. They aren't. To run *Multi-Vue* you only need to remove the `Grfint` module from the `OS9Boot` file and replace it with the `WindInt.io` module that comes with *Multi-Vue*, add the `Term-wind.dt` window device descriptor and the new window device descriptors `/w8` through `/w12` to the `OS9Boot` file, and keep the modules already in the `OS9Boot` file that work with your hardware. In other words, start by formatting a fresh disk. Create a `MODULES` directory on this disk with the OS-9 `makdir` utility, and save all the modules in your present `OS9Boot` file, except `grfdrv`, in the `MODULES` directory. Next, either create a procedure file of `Save` command lines (like those in `BuildMV`) with the build utility or your favorite editor, or just copy them one at a time from the keyboard.

> ***"After you save the modules from your own*** `OS9-Boot` ***file, copy the new module files from the*** `MODULES` ***directory on the reverse side of the* Multi-Vue *release disk to the directory on your freshly formatted disk."***

After you save the modules from your own `OS9Boot` file, copy the new module files from the `MODULES` directory on the reverse side of the *Multi-Vue* release disk to the directory on your freshly formatted disk. Again, you can either create a procedure file to do this for you, or copy them one by one from the keyboard. Do whatever is easier for you. You must also copy the `Term-wind.dt` and `CC3go` modules to your `MODULES` directory.

Next, create a `Bootlist.mv` file in that directory, using either the build utility or your editor. That bootlist should include both the names of each module you saved earlier and the modules copied from the *Multi-Vue* release disk and the OS-9 *Config* disk.

Now run `OS9Gen` and create your new `OS9Boot` file. If you mounted your new disk in Drive `/d1` and are running from an execution directory in a disk

```
180A        RETURN
180C
180D 1160 (* Port
1817        GOSUB 4000 \(* Open Overlay
182A        SHELL "gport"
1833        RUN Gfx2("OWEnd")
1840        RETURN
1842
1843 1170 (* Help
184D        RETURN
184F
1850 1180 (* Shell
185B        RUN Gfx2("GCSet",0,0) \(* Turn graphic cursor off
1888        RUN Gfx2("OWSet",1,1,8,72,12,1,0) \(* Create Overlay Window
18C2        RUN Gfx2("CurOff")
18D0        RUN gfx3(StdOut,"ss.wnset",ADDR(WndScr),WT_DBox) \(* Make Window
18FE        RUN Gfx2("CurOn")
190B        RUN Gfx2("Color",1)
191B        SHELL ""
191F        RUN Gfx2("OWEnd")
192C        RUN Gfx2("GCSet",Grp_Ptr,Ptr_Arr)
1943        RETURN
1945
1946 1190 (* Clipboard
1955        RETURN
1957
1958 2000 (* Dress up the opening box
1976        RUN Gfx2("Logic","XOR")
1989        RUN Gfx2("Color",1)
1999        HorPos:=10
19A0        REPEAT
19A2          RUN Gfx2("Box",320-HorPos,96-HorPos/4,320+HorPos,96+HorPos

               /4)
19D1          RUN Gfx2("Box",320-HorPos,96-HorPos/4,320+HorPos,96+HorPos

               /4)
1A00          HorPos:=HorPos*1.3
1A11        UNTIL HorPos>300
1A1D        RUN Gfx2("Logic","OFF")
1A30        RUN Gfx2("Color",0)
1A40        RETURN
1A42
1A43 3000 (* Close the Box
1A56        RUN Gfx2("Logic","XOR")
1A69        RUN Gfx2("Color",1)
1A79        HorPos:=300
1A81        REPEAT
1A83          RUN Gfx2("Box",320-HorPos,96-HorPos/4,320+HorPos,96+HorPos

               /4)
1AB2          RUN Gfx2("Box",320-HorPos,96-HorPos/4,320+HorPos,96+HorPos

               /4)
1AE1          HorPos:=HorPos/1.5
1AF2        UNTIL HorPos<10
1AFD        RUN Gfx2("Logic","Off")
1B10        RUN Gfx2("Color",0)
1B20        RUN Gfx2("OWEnd")
1B2D        RETURN
1B2F
1B30 4000 (* Make Overlay Window for Tandy Desk Acessories
1B63        RUN Gfx2("OWSet",1,0,0,38,21,0,1)
1B85        GOSUB 2000 \(* Make the open flashy
1BA0        RUN Gfx2("Box",0,0,639,191)
1BB8        RUN Gfx2("CurXY",1,2)
1BCB        PRINT "Please wait ... getting desk accesory from disk."
1BFF        RETURN
1C01
1C02 9999 (* Always turn off graphics cursor before leaving program
1C3E        RUN Gfx2("gcset",0,0)
1C51        END
1C53
```

Listing 4: `DoAlert`

```
PROCEDURE DoAlert
 0000       (* display Alert boxes and get response for DoMenu
 0032       PARAM action,query,msg1,msg2,msg3:STRING
 0049       PARAM WindowAddr:INTEGER
```

```
0050
0051       DIM button1,button2,button3:STRING
0060       DIM F_Sleep,CallCode,StdIn,StdOut:BYTE
0073       DIM WT_DBox:INTEGER
007A       DIM MouseSig,HorP,VerP:INTEGER
0089
008A       TYPE rodent=valid,actv,totm:BYTE; rsrv0:INTEGER; ttto:BYTE; tsst

            :INTEGER; cbsa,cbsb,ccta,cctb,ttsa,ttsb,tlsa,tlsb:BYTE

            ; rsrvl,bdx,bdy:INTEGER; stat,res:BYTE; acx,acy,wrx,wry

            :INTEGER
00FB       DIM msret:rodent
0104
0105       TYPE Registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
012A       DIM Regs:Registers
0133
0134       TYPE IntCeptCod=StBCode:BYTE; IntAddr:INTEGER; RTICode,IntResult

            :BYTE
014F       DIM IceptCode:IntCeptCod
0158
0159       IceptCode.StBCode:=$F7
0165       IceptCode.IntAddr:=ADDR(IceptCode)+4
0176       IceptCode.RTICode:=$3B
0182
0183       StdIn:=0 \StdOut:=1 \F_Sleep:=$0A \WT_DBox:=4 \MouseSig:=10
01A7
01A8       RUN gfx2("OWSet",1,3,4,28,6,2,3)
01CA       RUN gfx2("CurOff")
01D8       RUN gfx3(StdOut,"ss.wnset",WindowAddr,WT_DBox)
01F7
01F8       IF LEN(query)=0 THEN query:="What is your choice? "
0220       ENDIF
0222
0223       PRINT query \ PRINT
022A       button1:=msg1 \button2:=msg2 \button3:=msg3
0242
0243       WHILE LEN(button1)<8 DO
0250         button1:="    "+button1
025E       ENDWHILE
0262
0263       WHILE LEN(button2)<8 DO
0270         button2:="    "+button2
027E       ENDWHILE
0282
0283       WHILE LEN(button3)<8 DO
0290         button3:="    "+button3
029E       ENDWHILE
02A2
02A3       PRINT button1; button2; button3;
02B1
02B2       IF button1<>"        " THEN
02C8         RUN gfx2("Box",20,80,208,160)
02DF       ENDIF
02E1
02E2       IF LEFT$(button2,8)<>"        " THEN
02F9         RUN gfx2("Box",220,80,405,160)
0311       ENDIF
0313
0314       RUN gfx2("Box",420,80,605,160) \RUN gfx2("Box",430,85,595,155

            )
0346
0347       RUN gfx3(StdIn,"ss.msig",MouseSig) \(* Set Mouse Signal
0373
0374       CallCode:=F_Sleep
037C       Regs.x:=0 \(* Sleep until mouse is clicked
03A6       RUN SysCall(CallCode,Regs)
03B5
03B6       RUN gfx3(StdIn,"gs.mous",ADDR(msret))
03D0
03D1       HorP:=msret.acx
03DC       VerP:=msret.acy
03E7
03E8       HorP:=HorP*80/18
03F6       VerP:=VerP*24/4
0404
0405       action:="No"
040E
040F       IF msret.stat=0 AND VerP>192/6*3 THEN
```

mounted in Drive `/d0`, just type the following command line and enter to finish the job:

```
os9gen /d1 <bootlist.mv
```

When `OS9Gen` finishes, you'll have a new `OS9Boot`. Now, create a `CMDS` directory on your new disk and copy the `Shell` and `GrfDrv` files from the `CMDS` directory on the disk you had been using. If you want to run *Multi-Vue* immediately upon startup, add to your new `CMDS`directory the new files supplied in the `CMDS` directory on the front side of the *Multi-Vue* release disk, along with the `AutoEx` and `MultiStart` files from the directory on the back of that disk.

You can also boot up from the disk you just made if both `Shell` and `GrfDrv` are on its `CMDS` directory. You can then remove that disk and mount the system disk you normally use. After you put your old disk in the drive, type the following:

```
chd /d0 and chx /d0/cmds
```

to switch your current directories to it. To run *Multi-Vue* from your disk, copy the new *Multi-Vue* files for the `CMDS` directories on both sides of the *Multi-Vue* release disk into your own `CMDS` directory. To start *Multi-Vue* from your disk, just type "`multistart`".

I hope I've taken some of the mystery out of *Multi-Vue*'s installation process.

Our Listings

You'll find the source for `ClkSpd` and `ClkChk`, additional code with liberal comments for *MVShell* and another handy utility from Stephen Goldberg in this issue. Goldberg's *Strip* removes any leading or trailing spaces from your text files to save space on your disk. The command lines look like this:

```
strip myfile
strip 8 myfile
strip +30 myfile
strip -10 myfile
```

The first line removes all leading spaces from each line. The second strips eight characters from each line. The next strips all characters past column 30, and the last strips the last 10 characters from each line. *Strip*, another fine example of OS-9 assembly language programming, certainly beats editing each line.

That's it for this month. Until next month, keep on hacking! ☐

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```
042B          IF HorP<480 THEN
0438            action:=msgl
0440          ENDIF
0442        ENDIF
0444        RUN gfx2("CurOn")
0451        RUN gfx2("OWEnd")
045E        END
0460
```

Listing 5: Strip

```
**************************************************
*
* STRIP  -  COPYRIGHT (c) 1987 by S.B.GOLDBERG
*
* Strip all leading spaces or indicated number
* of leading or trailing characters from lines
*
* Use: strip [[+/-]count] [filename] [...]
*         no count = strip leading spaces
*         count = strip # leading characters
*         +count = strip characters after # column
*         -count = strip # trailing characters
*         count limits = 1 - 255 characters
*
* Standard output path can be redirected
*
* Omit filename(s) for standard input path to
* use in pipeline or with input redirection
*
          ifpl
          use     /d0/defs/os9defs
          endc
*
         mod    len,name,prgrm+objct,reent+1,entry,dsiz
*
flag     rmb    1   function flag
path     rmb    1   input path number
count    rmb    2   count storage
pointer  rmb    2   parameter pointer
buffer   rmb    255   I/O line buffer
         rmb    200   stack
         rmb    200   parameters
dsiz     equ
*
name     fcs    /Strip/
         fcb    1   edition number
         fcc    /(c)1987 S.B.Goldberg/
******************************
* CONVERT DECIMAL TO BINARY
******************************
binary   bsr    convert   convert first digit
         bsr    convert   convert next 2 digits
convert  lda    ,x   get character
         suba   #'0   make binary
         bmi    back   not valid digit
         cmpa   #9   valid digit?
         bhi    back   no
         pshs   a   yes, save it
         lda    1+count   get previous total
         ldb    #10   multiply by 10
         mul
         addb   ,s+   add current value
         stb    1+count   save new total
         leax   1,x   bump pointer
back     rts    return
******************************
* INITIALIZE
******************************
entry    clra
         clrb
         std    flag   standard input & clear flag
         std    count   zero count
         lda    ,x   parameter character
         cmpa   #'-   end strip?
         bne    plus   no, check for plus
         dec    flag   yes, set flag
         bra    bumpit   continue
plus     cmpa   #'+   strip past offset?
         bne    chknum   no, check for count
         inc    flag   yes, set flag
bumpit   leax   1,x   bump pointer
chknum   bsr    binary   decimal count to binary
******************************
* FIND FILENAME AND OPEN FILE
******************************
look     lda    ,x   parameter character
         cmpa   #$20   filename?
         blo    savpoint   no, standard input
         bhi    open   yes, open file
         leax   1,x   bump pointer
         bra    look   look again
open     lda    #read.   read mode
         os9    i$open   open file
         bcs    out   exit with error
         sta    path   save path number
savpoint stx    pointer   save parameter pointer
******************************
* READ LINES FROM FILE
******************************
read     ldy    #255   maximum line length
         leax   buffer,u   line buffer
         lda    path   input path number
         os9    i$readln   get line
         bcs    error   branch on error
******************************
* STRIP CHARACTERS
******************************
         ldd    count   strip spaces?
         beq    spacloop   yes, do it
         tst    flag   strip past offset?
         bgt    setend   yes, set new line end
         cmpy   count   strip entire line?
         bhi    test   no, continue
```

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```
         tfr    x,y   buffer address
         bra    cr   make blank line
test     tst    flag   end strip?
         bmi    endstrip   yes, keep buffer pointer
         leax   d,x   no, reset buffer pointer
endstrip tfr    y,d   length read
         subd   count   less strip count
         tst    flag   end strip?
         bpl    setend   no, continue
         decb   strip carriage return
setend   leay   d,x   end of line
cr       ldb    #$0d   carriage return
         stb    ,y   to end of line
*******************************
* OUTPUT STRIPPED LINES
*******************************
write    inca   standard output path
         ldy    #256   maximum length
         os9    i$writln   to screen
         bcc    read   continue if no error
*******************************
* ERROR CHECK AND TERMINATE
*******************************
error    cmpb   #e$eof   end of file?
         bne    out   quit with other error
         ldx    pointer   parameter pointer
         lda    ,x   parameter character
         cmpa   #$0d   another filename?
         bne    open   yes, open file
         clrb   clear error
out      os9    f$exit   quit
*******************************
* STRIP LEADING SPACES
*******************************
spacloop ldb    ,x   character
         cmpb   #$20   space to skip?
         bne    endstrip   no, display line
         leay   -1,y   decrement length
         leax   1,x   increment pointer
         bra    spacloop
*
         emod
len      equ    *
         end
```

Listing 6: MakeStrip

```
PROCEDURE makestrip
 0000      (* Generates the module "Strip" in the CMDS directory *)
 0038      (* The "Attr" utility MUST be in execution direcrory *)
 006F      (* or in memory for Makestrip to operate correctly *)
 00A4      (* For Level I OS-9 change "/dd" in pathlists to "/d0" *)
 00DD      DIM path,byt:BYTE
 00E8      DIM count:INTEGER
 00EF      CREATE #path,"/dd/cmds/strip":WRITE
 0108      FOR count=1 TO 208
 0118        READ byt
 011D        PUT #path,byt
 0127      NEXT count
 0132      CLOSE #path
 0138      SHELL "attr /dd/cmds/strip e pe"
 0154      END
 0156      DATA 135,205,0,208,0,13,17,129,248,0,67,2,149,83,116
 0187      DATA 114,105,240,1,40,99,41,49,57,56,55,32,83,46,66
 01B8      DATA 46,71,111,108,100,98,101,114,103,141,2,141,0,166
 01E6      DATA 132,128,48,43,17,129,9,34,13,52,2,150,3,198,10,61
 021A      DATA 235,224,215,3,48,1,57,79,95,221,0,221,2,166,132
 024B      DATA 129,45,38,4,10,0,32,6,129,43,38,4,12,0,48
 027C      DATA 1,141,202,166,132,129,32,37,15,34,4,48,1,32,244
 02AD      DATA 134,1,16,63,132,37,78,151,1,159,4,16,142,0,255
 02DE      DATA 48,70,150,1,16,63,139,37,48,220,2,39,60,13,0
 030F      DATA 46,24,16,156,2,34,4,31,18,32,17,13,0,43,2
 0340      DATA 48,139,31,32,147,2,13,0,42,1,90,49,139,198,13
 0371      DATA 231,164,76,16,142,1,0,16,63,140,36,195,193,211,38
 03A2      DATA 9,158,4,166,132,129,13,38,172,95,16,63,6,230,132
 03D3      DATA 193,32,38,209,49,63,48,1,32,244,159,244,189
```

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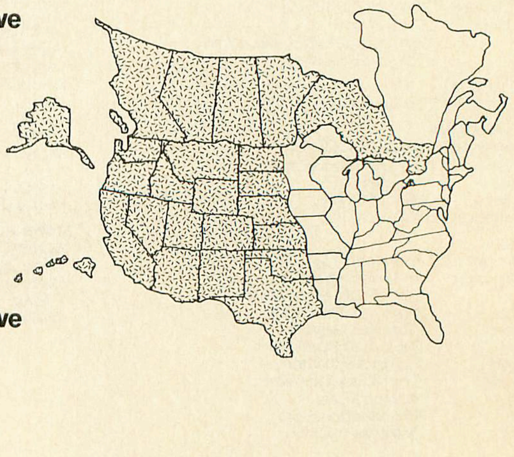

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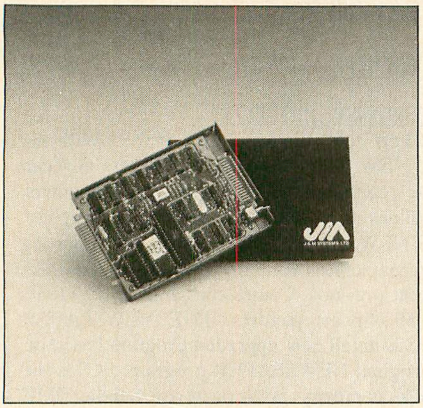

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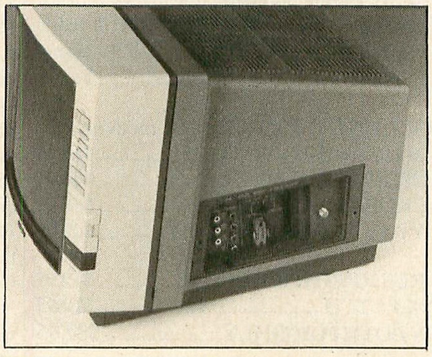

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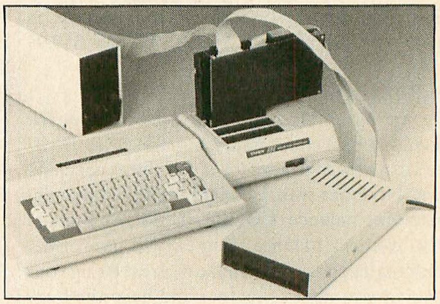

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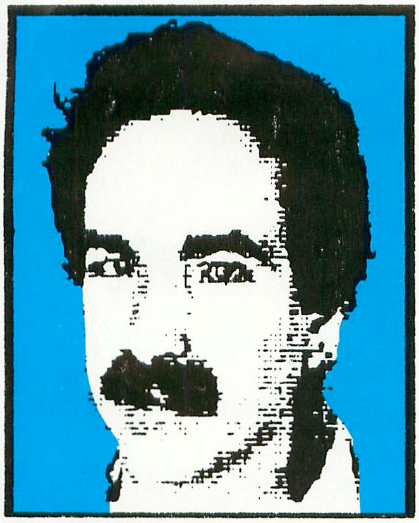

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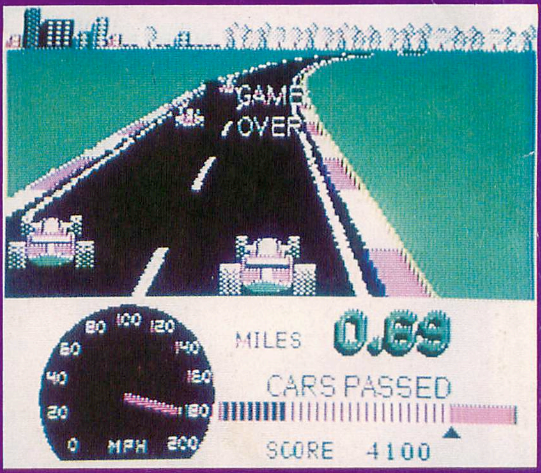
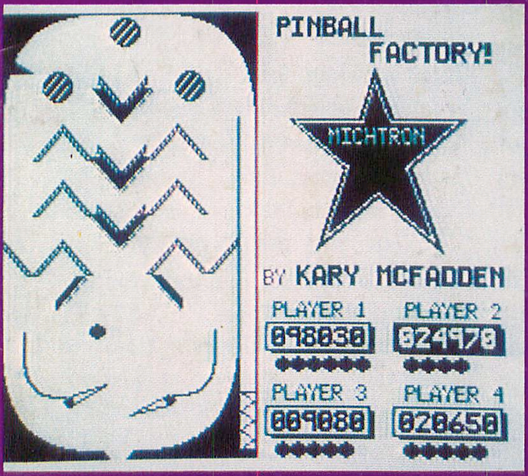
Speed Racer



As the checkered flag drops your pulse rises in this lively arcade game. The road twists to the horizon on the 3-D panorama that sets the stage for exciting racing. Vie for time as you glide through the curves at incredible speeds. Step through the gears to stay ahead of the pack, but be quick! Some will stop at nothing to see the end of the race, or the end of you! Four challenging raceways, complete with obstacles and colorful 3-D scenery test your skills in this Pole Position™ type game.

32K Color Computer required...$34.95

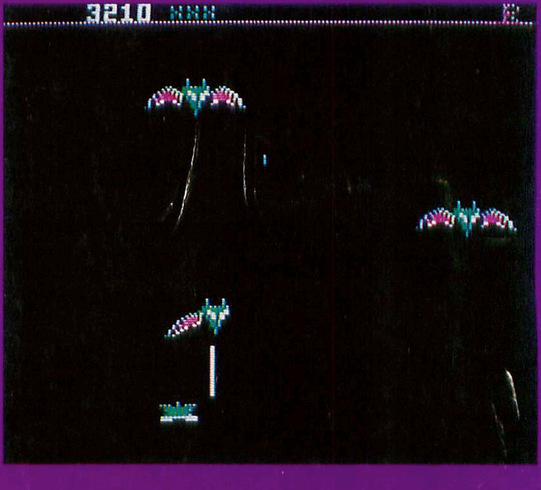


Pinball Factory

Video games come full circle in this tribute to the original arcade game, *Pinball*. Classic pinball springs to life as never before, with fresh new angles that only a computer can offer. Crisp graphics, sound, and fast smooth action give this machine-language arcade game a realistic, responsive feel you'll hardly believe. There are even "tilt" buttons that let you "bump" the machine. In addition to playing a great game of pinball, you can enjoy hours of creative pleasure as you design, build, edit, and play your own screens.

64K Color Computer required...$34.95

Demon Seed



The first waves of flying, diving, bloodthirsty bats are arriving. Move, fire, and move again. It's a never ending battle. If you are lucky enough to defeat the bats, be ready for a much greater challenge, The *Evil Demons* themselves. Destroy a wing and another takes its place. Only a direct hit can save you now. It will take great skill to triumph. If you do, then you better be ready for the *End*. The Demon Flag Ship descends to destroy your remaining ships. Your only hope is to penetrate the hull, break through the shield, and destroy the dreaded Gargoyle.

32K Color Computer required...$19.95

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